RAILROAD GAZETTE

SATURDAY, SEPTEMBER 23, 1871.

A New Steam Gauge.

This description is modified from one given in *The Engineer* by Prof. Ch. V. Zeuger.

The gauge is intended to avoid the defects of common air gauges, which have hitherto prevented the employment of the air manometer, and at the same time to be more accurate and unalterable in its working than the spring gauges now commonly used for steam boilers. In the first place, it is a great defect in the common air gauge that the divisions on the manometric tube diminish rapidly at high pressures, and consequently the reading becomes less and less accurate the higher the pressure. The new steam gauge, on the contrary, possesses the same degree of accuracy at all pressures; and even enables us to make the accuracy of reading greater at higher pressures.

Another serious defect of the air manometer is the liability to rupture of the narrow column of mercury consequent on the sudden shutting off or turning on of the steam. This is entirely avoided in the present instrument, by the use of two closed vessels communicating with each other only by a very narrow capillary tube. Finally the small column of mercury enclosed in the glass tube of common air manometers is subject to capillary depression and to the disturbing effects of heat upon the air bulb and upon the mercury.

In the instrument now to be described it is sought to avoid these defects by not using capillary tubes for the manometer, and by disposing the air and mercury in such a way as to make the effects of heat not sensible. The construction of the apparatus will be plainly seen from the annexed diagram, showing it in three different sections on a scale of one-fourth the full size, and as used for a locomotive. The air tube of the manometer consists of a series of glass tubes of equal lengths but of different diameters, melted together before a lamp and ending at the top in a glass bulb. The lower end is connected by an air-tight screw joint with the first of the two iron vessels containing mercury, or some other liquid, and communicating with each other only by a very narrow capillary channel. The manometric tube is sealed at the bottom, but there are two fine capillary openings through the sides at points below the surface of the mercury or other liquid contained in the two iron vessels. Hence the communication of pressure can only take place through a system of two successive capillary channels, and the resistance which these channels oppose to the motion of the mercury by which they are filled, makes it impossible for sudden changes to occur in the height of the manometric column, and thus entirely prevents the division of the column or the entry of steam or gas into the manometer. The steam or compressed gasses act directly upon the surface of the liquid in the second iron vessel, driving it through the capillary tube into the first vessel, and thence into the manometric tube by the capillary openings in it. Dust and impurities are in this way prevented from entering the first vessel and the manometric tube.

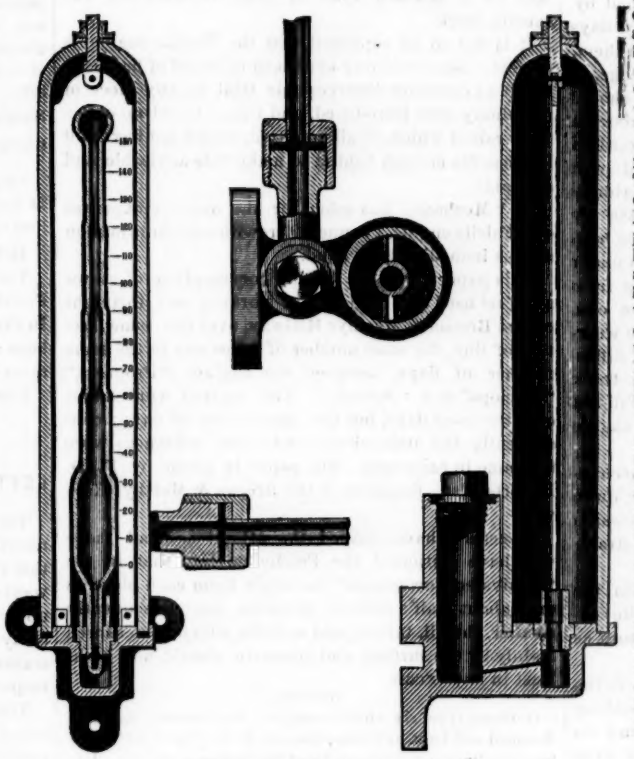
The capacities of the globe and of the several tubes which form the manometric tube are so adjusted that they increase in the some ratio as that in which the pressure increases, which is evidently what is required by Mariotte's law, in order that an increase of pressure of one atmosphere may cause the first tube to be filled with the enclosed liquid, and that a further increase of pressure of the same amount may cause the second tube also to be filled, and so on—each increase of pressure causing the same rise in the manometric tube.

The adjustment of capacities is effected as follows: Let the capacity of a manometer, divided so as to show pressures up to say (as in the present case) ten atmospheres, or 150 pounds, be called unity; and let v_1, v_2, v_3, v_4, v_5 and v_6 be the capacities of the first, second, third, fourth, and fifth tubes and of the bulb, respectively, each length of tube being taken to represent a pressure of two atmospheres or 30 pounds. Then we have $v_1 + v_2 + v_3 + v_4 + v_5 + v_6 = 1$ volume occupied by the contained air under a pressure of one atmosphere; $v_2 + v_3 + v_4 + v_5 + v_6 = \frac{1}{2}$ volume under a pressure of two atmospheres; $v_3 + v_4 + v_5 + v_6 = \frac{1}{3}$ volume under a pressure of four atmospheres; $v_4 + v_5 + v_6 = \frac{1}{4}$ volume or six atmospheres; $v_5 + v_6 = 1\text{-}5$ volume or eight atmospheres, and $v_6 = 1\text{-}6$ volume, the capacity of the bulb or ten atmospheres. This gives for the capacities of the different tubes when each section is 1 inch long

$v_1 = 1\text{-}2$ — 79 inch diameter.
$v_2 = 1\text{-}6$ — .46 " "
$v_3 = 1\text{-}12$ — .33 " "
$v_4 = 1\text{-}20$ — .25 " "
$v_5 = 1\text{-}30$ — .20 " "
$v_6 = 1\text{-}6$ — .36 " " of bulb.

To prevent the accidental breakage of the manometer, it is fastened to the graduated brass plate, and with it screwed to a glass cover ¼ inch thick, capable of supporting a pressure of 20 atmospheres. The glass cover is pressed by a screw at the top on a plate of india rubber, thus entirely preventing the entrance of dust or damp.

The apparatus has already been at work for sixteen months in several manufactories in Austria; and it has been found by comparative experiments with it in the Northern and State Railways of Austria, that it is steadier and more accurate than the standard spring gauges used by the company for graduating their own manometers.



IMPROVED STEAM GAUGE.

Two of these instruments were placed side by side on the same steam boiler, with a spring gauge by MM. Budenberg and Schaffer, of Magdeburg; and for a year and a half they remained in strict accordance all the time, not ½ lb. difference of pressure being indicated by them, although the temperature of the engine room varied greatly, and one of the air steam gauges was placed directly on the boiler (on direct steam) and quite near the fire, where the temperature reached 95 degrees Fahrenheit. The elasticity of air not being subject to alteration like the elasticity of a spring, which is greatly affected by heat and by rapid variations of pressure, the new gauge is more steady and requires less attention than spring gauges of any kind. It also possesses a great advantage in being much more sensible to small changes of pressure and in indicating them instanteously (a result which is unattainable with spring gauges); for the air gauge showed a diminution of pressure of about ½ lb. when the steam whistle of the boiler to which it was attached was sounded, whereas no motion could be detected in the spring gauges.

The Engineer, in its number of July 21, in an article on spring gauges, speaks as follows of the inaccuracies of the common gauge:

"It will be remembered that at Manchester, in 1869, gauges were brought to the Society's engineers to be tested which were as much as 30 lbs. wrong. These were, of course, condemned, but of those which were allowed to be used only nine out of fifty-two were correct, the others varying from 42 lbs. to 56 lbs. Last year none were condemned, but the number correct was even less, being eight in 120, the others varying from forty-four to sixty. This year twenty are correct out of ninety three and the others vary from 46 lbs. to 58 lbs."

The price of the new air manometer is not higher than the spring gauge, but permits greater certainty and accuracy in reading. It is to be obtained of Messrs. Elliott, Strand, London.

Eastward and Westward Freight Tariffs.

Throughout the year the total of westward-bound freight over all the railroads averages, relatively to eastward-bound freight, as one to four. This fact, of course, explains at once the facility with which reductions are obtained on nearly all the classes of merchandise destined for the West, and the difficulty of obtaining any modifications on the tariff established for the transportation of goods to the seaboard. The very nature of the products of the West necessitates their coming to the East to find a market, while the products and —owing to the "protective" tariff—the imports of the East are obliged, in many instances, to "beg" for a market in the West. To the fact that is the consequence of this protective policy is due both the independence of railway officials concerning products that must come eastward and the alacrity with which they seek for westward transportation business, even at rates which, if the eastward-bound freight were no larger than the amount bound westward, would bankrupt the richest railroad corporation in the country within a year. Merchandise for Western consumption is now eagerly sought by railway agents on a "through" basis of thirty cents per hundred-weight from this city to Chicago. The distance between the two cities, taking the average of the mileage of the three trunk lines, is 950 miles. The present rate of westward transportation is, therefore, about six dollars per ton per thousand miles, or, as nearly as may be, three-fifths of a cent per ton per mile. Such a rate, if not counterbalanced by a preponderance of gain from another source, would be obviously "ruinous." In order to form an exact estimate of the operation of so low a freight tariff, it is proper to give here an accurate account of the absolute running expenses of the freight department of a few principal railways. Throughout the year 1870 the actual cost of carrying freight over the New York Central & Hudson River road averaged 1.15 cents per ton per mile, while its receipts from transportation business averaged 1.86 cents per same weight and distance. On the Lake Shore & Michigan Southern road the expenses of freight carrying were 1.04 cents per ton per mile, while the receipts were 1.59 cents. The cost of freight transportation over the Erie Railway was, in 1870, ninety-eight hundredths of a cent per ton per mile, while the receipts were 1.38 cents. These figures are sufficient to show how nearly "ruinous" is the present westward rate of thirty cents per cwt. per thousand miles. But we have said that it is offset by the tariff on eastward freights; and it ought in candor to be added that, by just so much as the railway companies "cut" each other on westward business, so do they aid each other in maintaining without abatement the rates established for eastward-bound products. The result of this policy is that the lower the westward tariff is made the more impossible it becomes to obtain any reduction of the rates on goods destined for the coast. It will, therefore, be easily understood that the railway companies, although westward freights are at present unprofitably low, are not "ruining" themselves so rapidly as many people might infer.

These facts have been developed as one of the results of a recent determined effort to obtain from the three trunk lines the establishment of a *pro rata* tariff on the transportation of crude and refined petroleum in bulk and in barrels, and the permanent abolition of the present reasonless and arbitrary system by which refined oil in barrels is carried 200 miles farther and delivered for twelve cents per barrel less than crude oil in bulk is laid down for in New York. We admit that while the westward freights pay only half the cost of transportation, the half that is lost—with the addition of a small percentage of gain—must be recovered on the eastward freight rate, which must also pay a profit of its own; and that, consequently, either an abatement or a *pro rata* adjustment of oil tariffs cannot be effected until the westward rates shall be advanced. But at the same time it should be borne clearly in mind that this policy of charging half rates one way and making up the loss by exacting nearly double rates the other way, while it may enable railway managers to "make both ends meet," is severely oppressive to Western commerce that depends on Eastern and export markets for its very existence, and has reduced the trade of petroleum refining in the metropolis—as the railroad managers know by the insignificant amount of crude oil shipped for some weeks —almost to a stand-still. While, therefore, we acknowledge the justice of the railway companies' claim that they must so adjust the freight tariffs both ways as to obtain from them an ultimate profit, we must also express the conviction, which we believe we have herein demonstrated to be correct, that they should not adopt as a means of equalizing their own profit and loss a system of tariffs that affords undue advantages to one channel of commerce while it virtually blockades another.—*New York Bulletin, Sept. 13.*

—At the half-yearly meeting of the London & Northwestern Railway Company, the Chairman remarked that 150 miles of the line had been arranged on the block system, 400 miles were worked on their own warning block system, and, "in deference to public opinion" an order has been issued to work 550 more miles on the absolute block system.

—Contractors will be interested in the contract to be let October 2 for the construction of a levee around the city of Shawneetown, Ill. The portion to be let embraces about 250,000 yards of earthwork, and the front line is to be rip-rapped. The specifications are at the office of Carl Roedel, the City Clerk.

Contributions.

A WORD FOR THE FAIRLIE ENGINE.

TO THE EDITOR OF THE RAILROAD GAZETTE:

When you and I had tacitly agreed to drop the discussion of the Fairlie engine in favor of the immediate chance for trial, I supposed the matter at rest for the present; but a recent letter by "Mechanic," in which one of my papers was mentioned, and his asking for information in regard to coal, stores, etc., call for a reply. This, however, is as it should be. Such discussions must be benefited when those who are so directly interested and whose profession gives them such direct knowledge of the subject as "Mechanic" has, choose to take part in it.

Taking up his last point first, so that we may stand upon a fair footing, he was wrong in saying, "The "writers are evidently not in the habit of riding on lo- "comotive engines." Without any pretense of sufficient capacity for handling a train, or being responsible for the management of an engine, which requires peculiar qualities of mind and body only obtained by experience concentrated, I have yet spent many days and nights, in fair weather and storm, upon them, and have zealously tried to acquire the knowledge, in every way directed, of how the necessary duty should be got from one with the least amount of labor on machine and man. Generally it is well to regard an antagonist as occupying equally high ground with yourself; but as "Mechanic" has claimed superiority in this respect, I will point out that in this case my *practical* knowledge is of more use than his, since both the ordinary and Fairlie locomotives have fallen under my industrious observation, whilst he, judging from every point in his article, has experience only in one.

"Moving softly" will certainly not *prevent* the wearing of any machinery. Nothing will. But the difference to wrist pins and brasses between a rough track and a smooth one cannot require discussion. Will not the softness or roughness of movement in the engine produce the same effect?

The S pipe, though thought by some master mechanics to be better than the straight one, is yet not quite the thing, since the spring or recoil after compression or extension would probably have the effect of straining it and its joints.

I am aware of the effects of dust and grit upon the after parts of the locomotive, and as the Fairlie exactly reverses this upon each return trip, look to it as a means of gain in lessening wear.

The fact that flexible pipes were roughly made in the "earlier engines" of some of our builders has nothing to do with the matter. They are used now, and no complaints are made on that score by those who have used them. The design for those of Mr. Mason differs widely from that of Mr. Fairlie, yet both seem to answer an admirable purpose.

The difficulties of changing the location of water tanks with the present engine did not need a discussion. It has been the sad fate of the writer to locate many on a summit level—sometimes at greatly increased cost—because of the inability of the present locomotive with a standard train to get away from it, if placed elsewhere. Perhaps it was a keen remembrance of this oft-repeated necessity, and of the velocity required, which made him feel glad that the Fairlie engine could, by the simple process of taking on water just where the water was cheapest and most handy, increase the adhesion upon the track, and, the cylinder power between limits being mobile, save much cost in the construction of reservoirs, and also the danger and damage created by running at a hill with a long freight train.

This running at a hill, like the location of reservoirs upon the top, is with the present locomotive a necessity, but it is a sad one. There is no practical objection to difference of load upon the springs, unless as "Mechanic" seem to suspect, immense weights are used recklessly. Twelve tons upon 12 springs of the usual locomotive stiffness would depress them one-quarter of an inch. The springs of box cars, platform cars, and especially locomotive cars and locomotives, undergo a much greater margin of strain without difficulty. In regard to "hammering and jumping," I can only advise "Mechanic" to try a ride upon the "Janus." He will then know what the difference is, and should he, from long and continued riding on locomotives, have become unable to notice the jar of the ordinary engine, he will the more certainly note its *absence* upon the Fairlie, and may thereby measure it. "Mechanic" may be assured that not only to such "green ones" as he would make me out to be, but to men who have at least his experience, the difference has appeared wonderful. This is not only in the rise and fall, but because the Fairlie has no oscillation, and even her trains run steadier. Let him try it and know for himself. I feel certain that the greater his experience the stronger will be his realization of this fact.

I hope he believes me to some extent practical when reiterating so often "try it." As regards the "perfect "balance of parts on first-class locomotives," it is, leaving out small discrepancies or slight differences of makers, on an 8-wheeler of 30 tons just 10 tons at one end and 20 tons at the other. Equalizers do not made the connection, and could not change the balance if they did. The effect is, of course, impingement on the rail less or more as the track is better or worse. Not knowing of any trials made in this country to discover the amount of impact, we must look to the experiments of Von Weber, (GAZETTE, February, 1871,) where we find from trial on two engines, the one something like our own in this, that the fire-box rested between two axles and the leading wheels were situated nearly in the place occupied by our truck, an increase of 103 per cent., which is for a 5-ton engine an increased weight of 5.15 tons, or a full weight occasionally thrown on in running, and that not seldom, of 10.15 tons. This was on a German road of good construction and smooth track.

It is not to be supposed that the Fairlie engine is perfect. No machinery ever seen or heard of has been. But it as certainly deserves fair trial as any piece of machinery ever introduced, and I have heard no objections raised which, if all admitted, would not have still left benefits enough behind to make this advisable and desirable.

As "Mechanic" has asked for the working expenses of a Fairlie engine, I connect herewith such information as was immediately at hand.

This paper gives the actual consumption of stores and fuel used and total cost of working one fortnight on the Brecon & Merthyr Railway, over the same section of line, the same number of miles run in the same number of days, between the engines "Progress," "Cyclops" and "Severn." The engines worked not only the same days, but the same times of days; consequently the atmospheric and other influences were the same in each case. The paper is given by F. D. Roberts, Esq., Engineer of the Brecon & Merthyr Railway.

It seems to have escaped the attention of all those who have criticised the Fairlie engine, that in the "equivalent locomotive" the strain upon each piece is only about half; contact surfaces are consequently smaller, the oil, tallow, and so forth, which is measured mainly by the surface and pressure should not be at least in any excess.

CYCLOPS.

Ordinary type, six wheels coupled, tank engine, specially designed and built by Sharp, Stewart & Co., for working the heavy inclines and sharp grades of the Bercon & Merthyr Railway.

Cylinders 17 inches diameter, 24 inches stroke; 6 wheels coupled, 4 feet 6 inches diameter.

Eleven working days, one shed day; 935 miles.

	s.	d.	£	s.	d.
Coal, 23 tons 10 cwt., at	10	0	16	5	0
Oil, 4½ gallons, at	3	7	0	15	3
Tallow, 33 pounds at	0	5¼	0	14	5
Waste, 15 pounds, at	0	2¼	0	2	2
Hemp, 6 pounds, at	60	0	0	3	11
Wages, 12 days, at	11	8	7	0	0
			25	0	10

Cost per mile, 6.24d.

SEVERN.

Twin engine to Cyclops, built by same firm.

Eleven working days and one shed day; 935 miles.

	s.	d.	£	s.	d.
Coal, 30 tons 16 cwt. at	10	0	15	8	0
Oil, 5⅜ gallons at	3	7	0	19	4
Tallow, 39 pounds, at	0	5¼	0	12	0
Waste, Hemp, Wages, } Same as Cyclops			7	6	2
			24	5	6

Cost per mile, 6.24d.

PROGRESS.

Fairlie engine.

Four cylinders, 15 inches diameter, 22 inches stroke; 8 wheels coupled, in two sets.

Eleven workings days, one shed day; 935 miles.

	s.	d.	£	s.	d.
Coal, 34 tons 6 cwt., at	10	0	17	3	0
Oil, 8¾ gallons, at	3	7	1	9	7
Tallow, 11 pounds, at	0	5¼	0	4	10
Waste, 27 pounds, at	24	0	0	6	0
Hemp, 8 pounds, at	60	0	0	4	4
Wages, 12 days, at	14	4	8	12	0
			27	19	9

Cost per mile, 7.18d,

Progress: For 6,600 tons hauled, the coal used is 34 tons 6 cwt., being .54 pounds of coal per ton per mile.

Cyclops: For 4,576 tons hauled, coal 32 tons 10 cwt., being .74 pounds of coal per ton per mile.

Severn: For 4,576 tons hauled, coal 30 tons 6 cwt., being .71 pounds per ton per mile.

It will be seen from the above that the "Progress," with a consumption of 9.7 per cent. more coal does 44.5 per cent. more work.

The total cost for the "Progress" is 7.18 pence per mile run, while the average of the "Severn" and "Cyclops" is 6.34 pence; that is, the "Progress" does actually 44.5 per cent. with an increased cost of .84 pence per mile.

I am sorry that there is no means in my hands for getting at the "repairs" item, but will probably have it shortly. There is no doubt in my mind, however, that it will come under "Mechanic's" estimate as much as the oil account has done.

The following account of the operations of the locomotives "Mountaineer" (Fairlie), and "Gwendreath" (tank), is from General Malcolm, Managing Director of the Burryport & Gwendreath Valley Railroad:

Dated 67 SLOAM SQUARE, 28th May, 1870.

"I am happy to say the engine works well and most economically. I wrote to our Superintendent the other day, desiring him (as he reported that we were slack) to use our four-wheel engine and save the Mountaineer" (the latter is the Fairlie engine). His answer was that she worked far more economically than the smaller one."

Extract from letter from Captain Lockraft, General Manager of same railway:

Dated BURRYPORT, CARMARTHENSHIRE, 1st June, 1870.

"* * * * But I can give a gross estimate *for the same amount of work done.* The "Mountaineer" (Fairlie) will consume about two tons of coal where the other (the Gwendreath, tank) consumes three tons, and in a comparison of eleven days the consumption of oil and tallow was as follows:

Mountaineer (Fairlie), oil	11 quarts
" " tallow	7 lbs.
Gwendreath (ordinary tank), oil	7 quarts
" " tallow	11 lbs.

"The 'Mountaineer' is a 25-ton engine; the Gwendreath, 14 tons. The 'Mountaineer' takes more than double the load of the Gwendreath over the same track."

Both these roads are 4-feet 8½-inch gauge.

The "Progress" was the first engine made on the Fairlie princeple, the "Mountaineer," also a early one. In the building of neither had sufficient experience been attained to secure by slight changes of arrangement the best results.

I remain to yourself and "Mechanic,"

Very respectfully, LOUIS NICKERSON,
Civil Engineer.

LETTING CONTRACTS FOR RAILWAY WORKS.

The above subject is one that will not admit of much novelty, but still there are those who know but little of this very important part of railway business, from the want of experience, such as men who have been called upon to take their part in a new company and previously have had no knowledge whatever of railway transactions. To such these few remarks following are respectfully and more particularly addressed:

There are various ways of letting contracts, but only two are generally adopted, viz.: sealed proposals, and public auction.

The former has some advantages, if properly and honestly conducted. Supposing such to be the case, one advantage would be, that each bidder, not knowing what another bids, the work is more likely to be let at a fairly remunerative price. Another advantage is, that sealed proposals are (or should be) required to have the signatures of at least two responsible parties attached, certifying that the bidder is competent, thus making the fulfillment of the contract more certain.

But if it is required to have a more lively competition, the public auction plan, of course, is best. Local and other circumstances will, to some extent, control the choice of methods. However, the first-mentioned plan has been the most generally adopted of the two. Proposals are usually advertised for and blanks supplied by the railway company a proper and sufficient time previous to the day of letting.

The work of grading, bridging, etc., is most frequently let under six heads, viz.: earthwork, grubbing, rock-work, masonry, truss bridging and trestle or pile bridging; but often the whole together for one stated "lump sum." Again, the same is sometimes divided into lengths of from one to ten miles, and not unusually the whole is let to one party, with a specified price for each class of work. The most preferable of the three methods just mentioned is letting in small contracts, from the fact of their being more easily managed; and as contractors are very liable to financial embarrassments, the delay and, perhaps, damage to the enterprise would not be so great as it would were the whole let to one individual or firm. Again, when the whole is let (in whatever way) to one firm, it is probable that more or less sub-contractors will be introduced, and many of these may be entirely irresponsible or incompetent to complete what they undertake. There is still another and even greater difficulty in letting all to one party, and that is, it generally impairs the authority and power of the engineer to some extent, for the reason that an individual or firm wielding sufficient influence to undertake so large a contract is not very liable to be

ontrolled by an engineer, and the consequence is the work is often imperfectly done, overburdened with material, or too fragile for public safety. In a word, the engineer is looked upon as a mere tool, to be used to set stakes, give levels and take estimates. Now all, or nearly all, of these difficulties are obviated by letting in small contracts, the smaller I think the better, but not less than one mile, unless the work is very costly. Then the work progresses rapidly and smoothly, and should there be one or more incompetent or irresponsible contractors who fail, they are easily replaced without much detention.

The custom of letting to the lowest bidder is, in many cases, decidedly erroneous; for the lowest bid is often made by a party whose want of experience and judgment has caused him to bid less than the work will actually cost. Thus the work would be but partially completed when the contractor fails, and the result a derogatory name for the enterprise, or, at least, losses by the other contractors. Work should always be let on terms allowing a reasonable compensation for the contractor, and as near as possible or practicable, in accordance with the engineer's estimate. Earthwork should be let by the cubic yard, and measureable in excavation, embankment, or both. Probably the last-named is the fairest, which, of course, should be done for a less price, in proportion as the excess of excavation over embankment, or *vice versa*. The first-mentioned way of measuring is the most favorable for the contractor, as the volume of earth in its original bed exceeds that when moved into embankment, for different kinds, as follows:

Sand	1-7	Sandy loam	1-8
Clay	1-9	Gravel	1-11

The most economical for the party letting is to have embankment measure only, for then the contractor has to bear the shrinkage, and in most cases the embankment will exceed the quality of earth contained in the excavations. Grubbing may be let by the hundred feet, lineal rod, or mile. Rock work should be let by the cubic yard, and is best measured in quarry, as the volume of rocks in large fragments exceed that in original bed about one-half. Masonry is let by the cubic yard; truss bridging by the foot, running length, and includes all materials; trestle, straining beam and pile bridges, by the thousand feet, board measure, except the piles, which are let by the lineal foot; spikes and bolts by the pound.

Forms of contracts are very numerous; those most acceptable are the most brief, providing for the quality of the materials, the class of workmanship, when and where certain materials shall be delivered, and how, when and where to be paid for, and by whom, time for completion of work, the exclusion of intoxicating liquors, proper treatment of property-owners along the line, and against all malicious or improper conduct on the part of contractors or their employes, etc., etc. It is also necessary sometimes to provide for the relocation of any part of line, changing grades, and making the engineer umpire in case of any dispute between the company and contractor.

T. J. NICHOLL,
Civil Engineer.

Track-Laying in Nebraska.

BURLINGTON & MISSOURI RIVER RAILROAD IN NEBRASKA, September, 1871.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The track-laying on the first 55 miles of this road, being from Plattsmouth to Lincoln, the capital of the State, was let by contract; but it was thought best by the company to take the work thereafter into their own hands, as in case of delays arising from want of material, or the putting in of bridging, of which there was considerable, the men could be worked at better advantage for the company than if serving under a contractor, and the annoying claims for compensation for such delays generally made by contractors under such circumstances wholly avoided.

As the cost of track-laying in this western prairie country may be of service to you for comparison with that of other localities, I here enclose a few notes on the subject, being the result of this road's experience in the month of July, 1871.

The country through which our road runs west of Lincoln was in a primitive state, unsettled and destitute, as a general thing, of both wood and water. Arrangements were made, therefore, for supplying those employed with all conveniences needed for daily use by fitting up a train of cars particularly adapted to the work, which train, keeping constantly at the end of the track, supplied all wants.

The train consists of some fourteen cars, four of which consisted of ordinary flats with small houses, 12 by 28 feet, framed on them, which served to cook, eat and sleep in, the width of these moveable tenements being governed by the necessity of their passing through our truss bridges, and their length being that of the flat whereon they were framed. The rest of the train consisted of ordinary box and flat cars, adapted to the following uses:

One box car arranged for a dining-room, one as a bakery and store-room, one for occupation of the boarding "boss" and his family, one for the office and quarters of the civil engineers who give line and grade, etc., one as a portable ice-house, one for quarters of train-men and track-foremen, and four flats which carried three tanks of water for drinking and washing purposes, as also an extra supply for the locomotive, fuel for cooking, and short iron for use on curves.

The country not being well watered by natural streams or springs, and as wells have to be sunk from 100 to 110 feet to obtain water even for drinking purposes, recourse was had to damming the draws with which this rolling prairie is so well provided and catching the surface water, which can be pumped by hand or horse-power into tanks, or, if collected at a sufficient height above the track, may supply the tanks by gravity alone. The water thus obtained is better adapted for locomotive use than that obtained from wells, being much softer and more free from impurities detrimental to steam boilers.

This western country being a fine one for stock-raising, the method here mentioned for obtaining water must ultimately be adopted by settlers for such purposes to a great extent, and the country also is adapted to this use naturally, being of a rolling character with long draws which can be dammed with little expense so as to make lakes or ponds in some cases of great extent.

The force employed by us in track-laying is on an average 72 men, who lay from a mile to a mile and a quarter per working day, when everything works smoothly. This, of course, does not include the surfacing of the track, which is done subsequently; nor does the number of men above mentioned include those engaged in hauling ties, which is done by contract separately.

The ties are left by the contractor for hauling strung along in piles of four parallel to the center line of track, and being eight feet long this makes them distributed in about the right number for the space occupied, or so they can be placed about two feet apart. The placing of these ties is done by the company's men.

The expense in detail for the month of July for laying track *per mile* was as follows:

Track-layers, spikers, etc	$147.11
Train-men	7.30
Engineers and firemen	11.0
Locomotive expenses	29.30
Locomotive repairs	.33
Hauling ties (paid for by contract)	95.31
Use of mule for iron car	1.00
Superintendent of track-laying	5 40
Foreman of men placing ties	3.25
Foreman of track-layers	3.90
Cost per mile	$303.89

To the above must be added the wear and tear of the necessary outfit, which, in addition to the train previously mentioned, consists of the following articles;—

1 Iron car	$100 00
1 Set harness for mule	17.00
1 Grindstone	6 00
20 feet 1¼ in. rope	1 60
300 " ¼ " "	3.8
3 " ½ " cable chain	.20
2 Poles 3x3 in. x 27 ft. 6 in.	6.00
8 Level boards	4.00
4 Narrow track gauges	6 00
2 Wide " "	3 00
2 Tape lines	7.00
2 Iron forks	4.25
2 Sledges	6.86
1 Curving machine	20.0
20 Spike mauls	51.80
15 Iron bars	64.50
2 Claw bars	9.60
9 Mattocks	13 50
16 Picks	27.20
4 Track wrenches	13 28
2 Adzes	4.50
3 Cold chisels	2.90
78 Shovels	87 8[illegible]
2 Axes	2.00
1 Draw knife	1.10
4 Tie mauls	1.75
5 lbs chalk	.50
Total	$466 19

The cost of box cars delivered to the road at Plattsmouth is about $950 each, and of flats about $725. The expense of fitting up the four buildings with bunks and painted complete was about $200 each. These are made so that they can be used eventually for dwelling houses.

The car-load of ice at end of track containing ten tons lasts about three weeks.

F. W. D. HOLBROOK,
Assistant Chief Engineer and Assistant Superintendent.

P. S.—The rapidity with which our track has been laid with the force engaged, and the ease and quiet with which all work has been done, are due in great measure to the practical skill and watchfulness of the Road Master, Mr. A. A. Egbert, formerly Acting Division Superintendent of the Union Pacific Railroad, who has had superintendence of the track-laying here from the beginning, and is entitled to much credit.

The Massachusetts Railroad Commissioners on the Revere Disaster.

The Massachusetts Railroad Commissioners, having heard the evidence given before the coroner's jury in the case of the Revere disaster and examined the subject carefully, issued last week the following circular to the different railroads of the State:

To the President and Board of Directors of the ——:

In view of the publicity which has been given to all the incidents connected with the late accident at the Revere Station, on the Eastern Railroad, it is obviously unnecessary for this board, at the present time, to give you any general information in regard to it. Certain facts, however, nearly affecting the whole railroad system of the State, were clearly established, in the course of the investigations which have been had. To three of these we wish to call your particular attention, with a view to preventing, in so far as is possible, the recurrence of any such calamity in the future.

1. There can be no doubt that the delay of trains which immediately led to the Revere collision arose out of an obstruction of the main track of the Eastern road, which again was caused by the attempt of the company to operate a single-track branch road without the aid of the telegraph. Had this, one of the oldest, most ordinary, and least expensive of appliances in operating railroads, been in use on the Saugus Branch upon the 26th of August, it is to the last degree improbable that a collision would have occcurred. The cause of the disaster, therefore, was wholly unnecessary.

2 It was also clearly established in evidence, that that the colliding train discovered the train ahead of it while moving at a rate of speed not exceeding twenty-five miles an hour, and at a distance of a thousand feet from it. It was, however, equipped only with the old-fashioned hand-brake, and the evidence tended to show that the twenty to thirty seconds which intervened between the danger signal and the collision had not enabled the brakeman to reduce the speed of their train more than one-half, or, indeed, to fully set a single brake. Numerous descriptions of brakes operated instantaneously from the locomotive have been long in use, and are well known to all railroad machinists. The evidence was conclusive that there was ample space and time to have stopped the colliding train in this case, even after the collision was imminent, had a brake of this description been in use. Not only, therefore, was the primary cause of the disaster unnecessary, but the collision itself might at the last moment have been prevented by the use of familiar appliances.

3. It further appeared in evidence, and was in no way controverted by the company, that the stations upon this part of their road were but short distances apart, and that every facility, so far as employes, etc., was concerned, existed for a very perfect system of signals indicating the proximity of trains. No such appliances were, however, in use, nor, indeed, had their adoption ever been considered.

We now desire to call your attention to the fact that, in so far as we are informed, the neglect to avail itself of all the familiar precautions against accident which have been referred to has not been peculiar to the Eastern Railroad. The members of this board do not know of a single road in the State, and indeed but one in New England, which has a thorough telegraphic system; they do not know of one which has perfectly equipped even its fastest trains with the most approved brakes or the best form of car-construction to prevent "telescoping" in case of collision. Neither at the time of this accident was there a single road in Massachusetts which used any system of signals to indicate the time of passage of trains. In few of these respects was the Eastern Railroad behind the other roads of the State, and in certain of them it was in advance of almost all. It would seem, therefore, to have been purely a matter of accident that this disaster took place upon the Eastern instead of some other Massachusetts road.

Under these circumstances public opinion very justly and very distinctly calls for immediate and decided action both on the part of this board and of the railroad companies. The fact that sufficient safeguards have not heretofore been, and are not now, thrown around the traveling public, is painfully felt. The existence of this sentiment can hardly fail to leave a deep and lasting mark upon the railroad legislation of the State, and for obvious reasons it is very desirable that the essential reforms which will surely be exacted should at once be voluntarily initiated by the corporations themselves. The members of the board are, therefore, very solicitous to mature, as soon as possible, for legislative consideration, such a system of safeguards as shall at once secure throughout our railroads, in the greatest possible degree, the *maximum* of security to travelers with the *minimum* of expense to the corporations. In entering upon this duty we would anxiously solicit aid from all sources, and especially from those directly concerned in the management of railroads. With this end in view we take this occasion to request the several railroad companies of the State, through their proper officers, to meet us, for the purpose of conference, at the office of this commission, in Boston, on Tuesday, the 19th instant, at twelve o'clock m. We also propose to invite any committees appointed in consequence of the Revere accident, or other persons who may wish to attend, to be present, at the same time. Very respectfully, etc.

JAMES C. CONVERSE,
CHARLES F. ADAMS, JR.,
Railroad Commissioners.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.*

Engineering and Mechanics.—Mr. M N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

CHANNELS OF TRAFFIC.

Last week the St. Louis *Republican* published a letter from a correspondent at Plattsmouth, Neb., who writes to call attention to the numerous railroads which connect Chicago with the country north of the latitude of St. Louis, and especially with Omaha and Nebraska, and the paucity of St. Louis's connections with the same territory. In the course of his letter he recommends the publication of a map showing these railroads, which, he says, "with a well-written article explanatory of the gigantic efforts made by Chicago to govern and control the whole trade of this country, would at a glance do more to make St. Louis realize her needs than a thousand editorials on the subject that few readers would comprehend without such a map before their eyes."

He then describes the routes, in operation or in progress, which extend from Chicago into this country, and urges the extension of lines from St. Louis into the same district, and especially the securing and strengthening of the North Missouri Railroad and the completion of its line, now in operation from Brunswick through Chillicothe to Pattonsburg, to Council Bluffs.

This writer, like a great many other people, seems to take it for granted that to create traffic it is only necessary to make a route for it; that the numerous lines which connect Chicago with the West were constructed for the purpose of fostering the prosperity of Chicago, and that by making lines from St. Louis through the same country the traffic of these Chicago roads will instantly leave them and turn towards St. Louis.

We believe that there is a very wide-spread delusion on this subject. The people of Chicago deserve no such great credit for "gigantic efforts" and enterprise in pushing railroads through the country around them. The railroads were not constructed for the city; they were constructed for the traffic which tended towards the city. They were not, to any considerable extent, built by the people of Chicago; they were built by capitalists who saw that the traffic of the country west of the lakes, and for a considerable distance south, would find its cheapest and best outlet to the East through the great lakes from Chicago, and that therefore lines to Chicago would have a large business and make good profits. One or two railroad men in Chicago have had large tracts of land here, and have been very much interested in the growth of the city, and, very probably, were willing to subordinate their investments in railroads to their interests in city property. But the great majority of those who have built the Chicago railroads have had little interest in the city, and have made the lines simply as profitable investments, following the great law of trade by supplying that for which there was a demand. The city of Chicago, we believe, never voted a dollar in aid of a railroad. It has not been necessary for it to do so. The railroads could not afford to leave it to one side.

The chief object of railroads is to carry produce, agricultural or manufactured, from the producers to the consumers. A line between a food-producing country to a country chiefly devoted to manufactures is likely to have a considerable business. A line from one food-producing section to another is likely to have little to do. In this country the great lines of traffic are between the Interior and the Atlantic coast. But this is too general a definition. Although there is some importing and exporting at all the Atlantic ports, by far the greatest amount is done north of the Potomac and the most at New York. So for foreign trade the chief routes diverge from that part of the coast and from that port especially. We might have half-a-dozen good railroads between the Northwest and Savannah or Charleston, but it is not probable that a single shipload of our grain or provisions would ever be exported from those ports.

But the foreign exports and imports form but a small portion of the trade of the country. The great consumer of the products of the United States, especially its food products, is the United States. Now there is not, comparatively, a large exchange of food products between different producing sections. Each agricultural section produces nearly all of the heavy produce—breadstuffs, forage and provisions—for its own consumption. The cotton and sugar districts of the South are a partial exception to this rule. But these, though they do not produce all the food they consume, generally import but a fraction of such produce, and, being thinly settled, their demand has but little influence on the products of the nation, and, we may say, scarcely any on those of the Northwest.

So we find the market for our produce confined chiefly to the manufacturing districts and the great towns of the country. These are confined chiefly to a limited territory of the northeast portion of the United States—from Baltimore northward to Portland and as far west as Pittsburgh and Cleveland. This section of the United States consumes more than it produces, and in this comparatively small corner of the country is the great market for the breadstuffs, the forage, the stock, the wool, and much of the cotton of the rest of the United States. Thus both our foreign and our domestic trade converges to and diverges from this center. It is quite true that there may be and are many routes of importance, and with heavy traffic, which are not in the direction of any of these converging lines, but the general principle remains, that the great channels of traffic of the United States are between the Northeast and the Interior, and lines which look chiefly to the transportation of produce for their business are likely to be successful very much in proportion to the extent to which they can carry traffic in these great natural channels.

We have a striking illustration of this in the chief navigable waters of the United States. The Mississippi River and its tributaries form a great system of navigable waters, probably not less than 10,000 miles long, which enables steamboats to carry the produce to the Gulf from Pittsburgh, in the East, to Fort Benton, in Northern Montana, and from St. Paul and Chicago, in the North, to Chattanooga, in the Southeast. Yet this magnificent water route carries scarcely any of the food products of the country to tide water for export. That which is carried to the South by it is almost exclusively for consumption in the South, and the chief grain trade on the Mississippi and its tributaries consists of that which can make use of it economically as a part of a route to the Northeast. There is a considerable traffic on the Illinois, but it does not move down that stream towards the Gulf, but up it towards the Great Lakes on its way to the East. Millions of bushels of wheat are shipped yearly on the Upper Mississippi, but by far the largest part of it never goes farther south than the latitude of Chicago, but leaves the river by rail at Fulton, or some point further north, and makes its way eastward, chiefly to Chicago and Milwaukee, and thence by lake and canal to the East.

The other great system of which we speak consists of the Great Lakes, which, in connection with other natural and artificial channels, give a route from the Northwest to the East. This system is by no means so extensive as that of the Mississippi River. It barely touches the edge of the great producing country of the Northwest. The northern side of it is in large part barren and almost wholly a wilderness. It has hardly one navigable stream emptying into it. Yet it is incomparably the greatest of all channels for the produce exports of the country. It gives a cheap route and one of unlimited capacity to within 500 miles of the seaboard, but thence the route is of less capacity and more costly than river transportation. But it has the traffic because it lies in the channel of trade, and this stream of traffic which has turned so great a trade over the Great Lakes and the Erie Canal has been so great as to induce the construction of several railroads in the same general direction, and to give them a business larger probably than that of any others in the world of so great length.

The great advantage of a cheap water route to the East has attracted to Chicago a large trade from the country south of it for two or three hundred miles, which has shorter connections by railroad, but finds its cheapest outlet by way of the lakes. It has also received a large trade for as great a distance north of it, because the lakes prevent any railroad from that country to the East except through Chicago, and most merchandise must be received by rail, though produce is shipped by lake.

It is therefore evident why the chief outlets of the country west of Chicago have been made to Chicago and not to any place or places further south. Iowa finds its most direct route to the East, even by all-rail routes, by way of this city, and to go to St. Louis would be indirect. Most of North Missouri can reach the East quite as near by way of Chicago as of St. Louis, and, moreover, has intermediate and still shorter routes which pass between the two cities. Nebraska finds the route longer by way of St. Louis also. When we go further south the rail routes are as short or shorter by way of St. Louis, and the advantages of cheap lake navigation and other artificial advantages which are credited to the "enterprise," and "energy," and "gigantic efforts" of Chicago people, are the chief reasons why Chicago finds it possible to trade with that country.

We conclude that St. Louis will make a mistake if it expends its exertions chiefly or largely in enterprises to connect it closely with the country to some distance north of it. It will have, doubtless, intercourse with that country and find it profitable; but so long as the chief exports of Iowa, Nebraska, and North Missouri, and the country further north are grain and stock and provisions, and the demand for such produce for consumption or export is in New England, New York, and Pennsylvania, transportation by way of St. Louis will be counter to the channel of traffic and can hardly prove profitable. The field of St. Louis is west and south of it. It has there a territory of immense extent, not yet fully opened, but now rapidly growing, whose trade it will secure unless it drives it away. It should not look with jealousy at Chicago's intimate connections with Iowa and Nebraska; but it may reasonably question the wisdom of its policy, the enterprise of its merchants, and the completeness and efficiency of its railroad lines, when it sees (as it does see) a very large share of the Kansas business, and the largest share of the Texas cattle trade, passing by it, and even through it, on the way to Chicago. It can do much by enterprise and the improvement of its routes of transportation; but there is such a thing as wasted enterprise, and new railroads constructed at right angles with the direction of the traffic of the country will be profitable neither to their owners nor to the city. A railroad from St. Louis to St. Paul and one from St. Louis to Omaha may find a fair traffic, as the Illinois Central does in Illinois, but as a system of railroads from St. Louis northward similar to that from Chicago westward would be a most expensive and a most disastrous mistake. Towns and cities, as well as capitalists, in planning and executing new lines of railroad, should always bear in mind the prevailing direction of traffic.

Overworking Railroad Employes.

There has been, of late, some discussion in England on the overworking of railroad employes, which, we think, may be extended to America with great propriety. The public and the railroad companies have the right to claim from their employes—especially locomotive engineers, switchmen, etc., the most patient and constant vigilance and obedience; but, on the other hand, managers must bear in mind that there is a limit to human endurance, and that a position requiring constant exercise of the power of attention rapidly exhausts that power, though it may not be otherwise fatiguing or physically laborious. These are facts which cannot be neglected without incurring danger; and any evil results growing out of such neglect are justly chargeable, not to the exhausted

employe whose faculties have given way under long-continued strain, but to those who imposed a burden too heavy to be borne. Human nature and human endurance are not to be gauged exactly, and we have, and can have, no data concerning them absolute and exact, like an engineer's tables of the strength of materials. There are, however, certain limits which are—or should be—well known, and the manager who exceeds these in laying out the work of men is just as culpable and incapable as the engineer who puts too weak timbers in a bridge.

There are emergencies, of course, when men must work an unusual number of hours, and in cases where muscular exertion alone is required such overwork is not likely to be seriously injurious. But in positions where the faculty of attention must be constantly employed, overwork is *always* dangerous.

The facts related in a letter from a Member of Parliament to the Chairman of one of the leading English railroads, printed on another page, are simply shocking. Such a course is simply an invitation of disaster, which hardly any emergency could justify.

In the armies of the world sentries are limited to two hours duty at a time. Men often ask to have their terms of service doubled in time, in order that they may be fewer in number, but no good officer will permit this in a position where surprise is possible. The sentinel's vigilance is almost sure to relax if he is kept at his post four hours. It is true that the monotony of his duty and the great rarity of danger have much to do with this, and it is undoubtedly true that an engineer can keep his place safely for a much longer period; but there is at least some similarity in the two very different services, and railroad men, whose profession is hardly forty years old, may well take a lesson from the soldier, whose profession is older than history.

The Gilman, Clinton & Springfield Railroad.

On the 15th inst. the last rail was laid on this road, and a construction train entered the city of Springfield. The road extends from Gilman, at the junction of the Chicago Branch of the Illinois Central with the Toledo, Peoria & Warsaw Railway, southwestward 120 miles to Springfield, crossing the Lafayette, Bloomington & Mississippi Railroad (soon to be completed) about half way between Bloomington and Paxton; the Indianapolis, Bloomington & Western east of Leroy; the main line of the Illinois Central at Clinton; the Pekin, Lincoln & Decatur at Pulaski, and connecting at Springfield with the railroads at that place.

The Pennsylvania Company, or individuals identified with that corporation, have guaranteed the bonds of the Gilman, Clinton & Springfield Company, and it is understood that the new road will be worked as a branch of the Pittsburgh, Cincinnati & St. Louis Railway. For eastern business from Springfield, however, it will form quite an indirect route, as the traffic carried northward to Gilman must be carried southward quite as far after reaching Logansport on its way to Columbus and Pittsburgh. It is reported that the Illinois Central will run trains over the new road to Springfield, and if this is true, unless discriminations shall be made against Chicago business, we imagine that the greater part of the traffic from the new line will go northward and not eastward from Gilman.

The distance from Chicago to Springfield by this route will be 200 miles. Besides the advantage to the Illinois Central of the business from the new line, it will give a desirable connection between the main line and the Chicago Branch, to which the traffic of the main line chiefly tends.

The Warehouse Law.

Suits have been brought against the proprietors of six of the elevators of this city by the State's Attorney, for violation of the provisions of the warehouse law passed by the last Legislature in accordance with the provisions of the new Constitution. The charge is, receiving and storing grain in the manner permitted only to "public warehousemen," without procuring a license therefor and complying with the provisions of the law.

This is a case in which the validity of the law is denied by the warehousemen; and the cases, doubtless, will be carried to the Supreme Court and their decision determine whether and how far the law is binding.

Correspondence with the Master Mechanics' Association.

We are requested to call attention to the fact that communications to the Secretary of the American Master Mechanics' Association should hereafter be addressed to J. H. Setchel, Master Mechanic Little Miami Railroad, Cincinnati, Ohio.

Some Railroad Statistics.

From Poor's recently published "Railroad Manual" we deduce some interesting statistics.

It will be found that, commencing from the year 1841, at which time there were 3,535 miles of railroad, until 1848, the yearly increase was about 300 miles. From 1848 to 1855 there was a yearly increase of 1,700 miles; then for two years at the rate of 2,400 miles; and from that date a gradual diminution till the minimum yearly mileage was reached in 1861. From that date there was a gradual increase until the close of the war in 1865, when so great an activity was shown that while in 1865 the increase was 3,000 miles per annum, we find it last year to be 6,000 miles.

There are something like 1,300 to 1,400 railroads projected, in progress, and completed, and the number is rapidly increasing.

As illustrating the variety of gauges and the number of each kind, we have deduced the following table, which shows the differences of practice in this country:

Gauge.	*No. of Railroads.*
3 feet	2
3 " 6 inches	2
4 " 3 "	1
4 " 3½ "	1
4 " 5½ "	1
4 " 6 "	6
4 " 8 "	3
4 " 8½ "	307
4 " 8¾ "	2
4 " 9 "	13
4 " 9¼ "	3
4 " 9⅜ "	1
4 " 9½ "	7
4 " 9¾ "	1
4 " 10 "	80
5 "	74
5 " 2½ "	1
5 " 9 "	1
6 "	31

We find by examination that there are upwards of 10,000 locomotives and about 214,000 cars of all kinds, which makes a ratio of 1 locomotive to 20 cars. It must be recollected, however, that coal companies using a great number of cars (and those mostly 4-wheeled) with comparatively few locomotives increase this ratio, while only a few smaller roads, constructed through mountainous country, require greater locomotive power in proportion to the amount carried. Allowing 30 feet only as the length of a car, we would have, if all the cars were connected in one line, a train extending from New York to the Mississippi River; while, allowing 50 feet as the length of engine and tender, there would be a line of locomotives 100 miles long. The total mileage of railroads was 53,399 at the beginning of 1871. Illinois comes first in the total length of its roads; Pennsylvania follows closely, then come in order New York, Ohio, Indiana, and scattering along all the other States and Territories, concluding with Rhode Island, with 136 miles.

NEW PUBLICATIONS.

The Engineering and Mining Journal.—We have neglected hitherto to call attention to a change in the ownership of this journal, which was formerly published by Western & Co., but a few weeks ago went into the hands of the "Scientific Publishing Company," which, we believe, the editors of the *Journal* control. The *Journal* has been for some time edited by Rossiter W. Raymond, who occupies the position of United States Commissioner of Mining, and is a mining engineer of eminence, and, withal, a practical writer. There is associated with him as editor, Mr. Willard P. Ward, who is also the manager of the publishing company.

Since the change in the proprietorship there has been a change in the form and, to a certain extent, in the matter of the paper, which is now entirely disconnected from the patent business, no longer gives lists of patents issued, but has a readable department of popular science, and continues to give a summary of mining news, which includes the whole United States, and, so far as gold and silver mining is concerned, is more complete, we believe, than any other published. It also gives full statistics and quotations of the anthracite coal trade.

It is easy to see that the field for a journal of this kind is very great, and that, both as regards news and technical information, it gives room for the exercise of much labor and ability, and the expenditure of a great deal of money. While it is not true that the *Engineering and Mining Journal* is complete and beyond improvement, it is true that it is well conducted and progressive, and aims to become something better than American technical journals have been hitherto. These efforts deserve encouragement. With sufficient support the conductors of this journal would doubtless make it as complete as its foreign rivals. As it is, they make it very valuable.

—The signalmen at Crewe, on the London & Northwestern Railway, have been divided into three classes, viz.: third-class receiving 20s. per week have no alteration; second-class, at 20s., have been advanced 1s. per week; first-class, receiving 21s., have been advanced 1s. These latter, it is said, have been working on the eight hours' system, but the others have to work, as usual, twelve hours per day or night every alternate week.

THE MASTER MECHANICS' CONVENTION.

[Editorial Correspondence.]

LOUISVILLE, September 16, 1871.

To describe the Master Mechanics' Convention at this time and place is very much like writing about a ball the day after, when the rooms are deserted and the guests gone. The Galt House is now comparatively deserted, whereas a few days ago it was thronged with those who came to attend the Convention. The assembling together of old acquaintances and friends who have not seen each other for a year past is in itself exhilarating. Meeting together as the Master Mechanics do, with a common object in view, in which they are all keenly interested, exchanging friendly greetings and knowledge and experience, partaking of good cheer at the same table, and discussing subjects which have been long and earnestly studied, all contribute to make these annual meetings occasions of much interest, profit and pleasure, but the description of them sounds very tame and dull when recited in a more or less prosy letter.

Of the character of the proceedings we will have have more to say in future numbers, and then make some of the reports special subjects of comment. In one respect, however, the difference between the Convention of this year and that of last was very gratifying to all its friends. We refer to what has been especially complained of by some, viz.: the somewhat too general convivial character of the meetings.

With the exception of a very simple collation unexpectedly supplied by the Ohio Falls Car Company, no invitations to eat or drink were received or accepted by the convention in a body. The business was commenced promptly and transacted with perhaps *too much* dispatch, the greatest fault with the proceedings being that the subjects for consideration received too little discussion. Members held back and could not be induced to come forward and state their views or objections to the reports. To a person acquainted with the antecedents and experience of most of our master mechanics, this is easily understodd. As a class, they are more accustomed to *do* things then to talk much about them. In private conversation they can theorize about matters relative to their business, and communicate their knowledge very concisely and clearly, but they somehow seem to have a mortal apprehension of saying the same things in public. This is very much to be regretted, as the meetings would be of a great deal more interest if there were a more general exchange of opinion. Some special effort, we think, should therefore be made to call out discussion. We think that the adoption of the suggestion made in the RAILROAD GAZETTE of September 9, to admit as associate members some who are not master mechanics, will do much in this direction. In fact, the danger which some of the members seemed to apprehend from this source was, that the associates might do too much talking. There is, of course, a danger that such might be the case; but the Association has so carefully guarded itself against the admission of an overwhelming number of new members that, unless it is very careless about those whom it does admit, there will be no danger that the active members will be overwhelmed. The number of associates is limited to twenty, and seven were admitted, so that there remain thirteen vacancies which can be filled at the next meeting. As there will probably be more applicants then the limitation will admit, it would be wise to exercise considerable caution and discrimination in the selection of them, so that the best and most useful men may be admitted.

The arrangements made for holding the meetings and the facilities afforded by the proprietors of the Galt House were all that could be desired. There were, however, two evils attending them which it might be well for the committee to provide against next spring. One of these is the noisiness of the room. Being at the corner of two much-frequented streets, the wagons created such a din that often it was impossible to hear what was going on. The attention was thus diverted, and many would get up at such times and leave the room, simply because they could hear hardly a word of what was said. The other evil was in holding the meetings in the hotel. The attention of members is easily diverted by proffers of hospitality from their friends and others who are in attendance, and who avail themselves of the facilities afforded by the hotel, but who could not hold out the same enticements if the Convention met in a hall elsewhere. We trust, therefore, that hereafter the Committee of Arrangements will select a place which is quiet, and in a location where "entertainment for man and beast" is not convenient. In saying this much, we trust that our readers will not understand what we have said as implying more than is expressed. There was less that was indecorous about

the Convention this year than at any previous meeting, and the dignified character of the deliberations was the subject of general remark, as the following notice from the Louisville *Courier-Journal* will testify:

"It might be well to refer to the morale of its membership. The gentlemen composing this Association present an appearance remarkable in a collection of so large a number of men—dignified in all their discussions, temperate in their debates, exhibiting marked and varied cultivation outside of the topics upon which they are supposed to be peculiarly familiar, the American Railway Master Mechanics' Association is a body that is a pride to any profession. It is only to be hoped that they are satisfied with their reception here, and may carry away with them actually the impression expressed in their complimentary resolutions."

The following were among the ladies present: Mrs. Britton, Cincinnati; Mrs. Chapman, Cleveland; Mrs. Hayes, Chicago; Mrs. Burke, Memphis; Mrs. Toothe, Linden, N. J.; Mrs. Brady, Chicago; Mrs. Cooke, Paterson, N. J.; Mrs. Strong, New York; Mrs. Riley, Indianapolis; Mrs. Carpenter, Chicago; Mrs. Shaver, Pittsburgh; Mrs. McAllister, Camden, Pa.; Mrs. Glass, Pittsburgh; Mrs. Sedgley, Cleveland; Mrs. Perrine, Taunton, Mass.; Mrs. Kidder, Buffalo; Mrs. Ellis, Schenectady, N. Y.; Mrs. Kerr, Bordentown, N. J. We wish we knew some very soft and gentle words to describe the grace which they imparted to the sojourn in Louisville, or knew how to tell the kindly words of sympathy and encouragement which they had for those still in the dark valley of single wretchedness. We have not the language, however, and can only say that they imparted an atmosphere of gentle consolation, with a sort of emotional appeal to the better natures of the unregenerate bachelors.

The ladies accompanied the gentlemen on an excursion across the river to Jeffersonville and New Albany to view the bridge and visit the Ohio Falls Car Works. At the latter place the whole party were received by the officers of that establishment and conducted through their works. In their office good cheer awaited the visitors; and there was a jolly time generally. On the way back there was much amusement and many jokes at any one's expense who could be made a victim.

After the adjournment of the Association a considerable delegation, at the invitation of the Louisville & Nashville Railroad Company, visited Mammoth Cave. Other duties occupied my attention, so that I could not accompany the party, and must, therefore, allow one who went with them to tell the history of the visit.

"The party left the Galt House in omnibuses provided for them. The railroad company provided one Pullman sleeping-car, and one ordinary day coach. The Pullman car was appropriated to the ladies. Mr. Thatcher Perkins, Superintendent of Machinery of the Louisville & Nashville Railroad, superintended the departure of the excursion. The journey to Cave City was relieved with songs, jokes and other amusements, and that place reached about 2 a. m. Many availed themselves of the hospitality of the hotel, which furnished those who so desired with sleeping accommodations. In the morning the whole party were called at 6 o'clock, and after breakfast the journey to the cave was made in old-fashioned stage coaches. The distance is about 7 miles, and owing to the rain the roads were muddy and the journey more tedious than it would otherwise have been.

"At the hotel at the cave the party were received, and such as desired it were supplied with a costume for exploring the bowels of the earth. The dress was often more picturesque than becoming, and many were the jokes made at the expense of those who thus presented a rather comical appearance. The ladies' suit had somewhat of the Bloomer character, so that few had the courage to adopt it. As usual, each one of the party was provided with a light, and charged to keep it burning, so that for a time at least they made their light shine.

"In the cave Mr. Hayes, of the Illinois Central Railroad, was elected President of the expedition, and Mr. Morris Sellers the historian. The river was too high to cross; it always is—at least so the guides say—and therefore the journey of the party was confined to what is called the "short route." All the visitors joined in singing, looked for the stars at the suggestion of the guide, without, however, following his directions of butting their heads against the rocks in order to see them more vividly.

"At the star chamber all the lights were put out, and special injunctions given not to kiss the girls; but as all the ladies present were married, and near their husbands, there is every reason to believe the rule was strictly obeyed.

"A monument was erected to the memory of deceased members and all contributing their assistance. When finished it was dedicated by the President of the Association, and left a silent record of the visit.

"The return from the cave and to Louisville was accomplished in very much the same way as the journey to it. At Louisville the members separated and scattered to their homes not to meet again until next spring."

As will be seen from the proceedings, the time of meeting has been changed from September to May, as it was thought that the majority of the members were not so busy at that time of year, and therefore better able to attend the meetings than in the fall. Boston was selected as the place for the meeting, which seemed to suit every one. There was a very general expression of satisfaction from the members at the hospitality of the railroad companies of Louisville, and also at the fact that no attempt at giving the Association a public reception had been made. This resulted, not from any indifference to the good will of the people of Louisville, but from a feeling that the repute and influence of the Association had been injured at previous meetings by the too generous entertainment of the friends of the master mechanics. There was a general expression of the hope that at future meetings nothing but "individual hospitality" should be shown to the Association.

Altogether the session was one of the most satisfactory which the Association has yet held. F.

Railroad Earnings in August and from January 1 to September 1.

Earnings for August hardly show as favorably as those of July, when compared with the same month of the previous year. The total receipts of grain and corn at the five principal Western cities in the month of August have been as follows, in the present and three previous years, viz: In August, 1871, 17,617,718 bushels; in 1870, 12,675,698 bushels; in 1869, 12,622,816 bushels; in 1868, 17,874,703 bushels. The movement of new grain in August, however, is only in its beginning, as many of the farmers are unable to give the time necessary to thresh and forward their harvested crops to market at so early a date. Competition and lower prices of produce have materially reduced the rates of freight from what they were a few years since, and the earnings of those years, on the given amount of freight, are no criterion upon which to estimate the earnings of the present. The most important increase in earnings last month is shown by the Central Pacific, Michigan Central, and Toledo, Wabash & Western, all of these roads operating a considerably increased mileage. Illinois Central, Milwaukee & St. Paul, Ohio & Mississippi, and Union Pacific, show some decrease. Kansas Pacific approximate earnings in August were $322,885.

RAILROAD EARNINGS IN AUGUST.

	1871.	1870.	*Increase.*	*Decrease.*
Central Pacific	$995,065	$807,815	$187,250	...
Chicago & Alton	529,278	506,680	22,588	....
Cl'v'l'd, Col., Cin. & Ind.	300,759	325,774	34 985	.....
Illinois Central	834,308	890,051	....	$64,743
Marietta & Cincinnati	187,341	11-,407	18,934	....
Michigan Central	529,890	409,928	119,962	....
Milwaukee & St. Paul	506,557	661,020	....	154,463
Ohio & Mississippi	288,189	300,971	....	12,4?2
Pacific of Missouri	329,270	325,044	4,226	....
St. Louis & Iron M't'n	131,489	123.000	8,489	....
Toledo, Wabash & W'n	552,079	466,431	85,648	....
Union Pacific	*603,075	664,050	....	60,975
Total	$5,767,600	$5,608.171	$482,092	$292,663

*Approximate.

For the eight months of 1871 now passed, the earnings of nearly all the prominent roads show a material increase over the same time last year. In our last articles upon earnings, published Saturday, August 19, we referred to the extraordinary savings in operating expenses, shown in the annual report of the Chicago & Northwestern road, resulting in an increase of net earnings over the fiscal year 1869–70, of $20,774. These figures were erroneously printed, and should have been $1,029,555. In the same article we referred to the decrease in expenses shown by the Union Pacific road this year, and adverted to certain newspaper comments which had been made upon the fact, accompanied by the suggestion that there might have been some different method of keeping the company's accounts in the two years. In regard to this, however, we are informed that the accounts are kept in precisely the same method this year as last, and the large saving in operating expenses is the legitimate result of a more economical management. It is claimed by the friends of the Union Pacific that the road can be very cheaply operated on account of its large proportion of level road, the proximity of coal supplies in the mountain section, the limited falls of rain on the route, and some other reasons, and it has been stated by parties who should be well informed, that on a business of $800 000 per month the road can be operated and kept in repair for 40 per cent. of the gross earnings.

EARNINGS FROM JANUARY 1 TO SEPTEMBER 1.

	1871.	1870.	*Increase.*	*Decrease*
Central Pacific	$4,909,244	$5,018,281	$890,963	....
Chicago & Alton	3,417,610	3,' 30.811	416,799	....
Clevl'd, Col., Cin. & Ind.	2.3-3,551	2,027,351	366,197	....
Illinois Central	5,384,056	5,37-.034	14,022	....
Marietta & Cincinnati	1,(06,698	846,941	159,757	....
Michigan Central	3,633,656	2,985.8'8	667,788	....
Milwaukee & St. Paul	3,916,279	4.383,656	....	$467,377
Ohio & Mississippi	1.944,132	1,947,446	....	3,334
Pacific of Missouri	2.237,349	2,222,408	14,941	....
St Louis & Iron Mount'n	1,004,772	853,635	151,137	....
Toledo, Wabash & West'n	3,530,227	2,644,016	886,211	....
Union Pacific	4,687,032	5,105,024	....	417,973
Total	$39,094,626	$36,415.494	$3,567,815	$888,683

—*Commercial and Financial Chronicle.*

English and American Machine Shops.

In comparing the system and general management which is almost uniformly adopted at the large engine and machine shops in England with that practised at works of a similar character in this country, a mere casual observer, perhaps, would discover no great contrast; those, however, who have visited both, and have thoroughly examined their workings, find very much that can be placed in the scales of comparison. Indeed, thre are many things which present themselves for consideration; and questions as to the expediency, practicability, and economy of certain plans, processes, and manipulations are constantly arising. One of our best railroad master mechanics, who a few year ssince visited the mother country on a pleasure excursion, returned with the opinion that, as regards English locomotives and railroads, there was nothing worthy of note above the top of the rails. Such a statement could proceed only from a superficial examination. Although we have made great and rapid advances in almost every art and manufacture, and crediting a very great deal to American ingenuity and American inventive faculty, still are we so much ahead of all other nations in the construction of machinery that it would be a waste of time to look over the fence and examine what our neighbors are doing, and how they manage their fixed and rolling plant?

After visiting the large machine shops in Liverpool, Birkenhead, Manchester, Leeds, Birmingham, London, and Glasgow, we find that, although the management differs somewhat in minor details, there is, nevertheless, a common system adopted and followed in all of them. For instance, the hours of labor may be differently divided, by having two or three intervals for meals; but punctuality is invariably enforced. The tap of the hammer commences with the last toll of the time-bell, or on the cessation of the steam whistle; and the workman who is habitually a few minutes late, or constantly absent from his work, is certain to be discharged. *There* is the commencement of a discipline that is followed up with rules and regulations which are strictly observed in the care of the workshops and the manipulation of the work. Laborers are employed to sweep the rooms, clean and oil the shafting, wipe down the tools, brush the vice-benches, and carry off all scraps and superfluous materials, not *weekly* but *daily*. Store-rooms are kept by trusty servants, who deal out files, cotton waste, emery paper, etc., to the workmen as required.

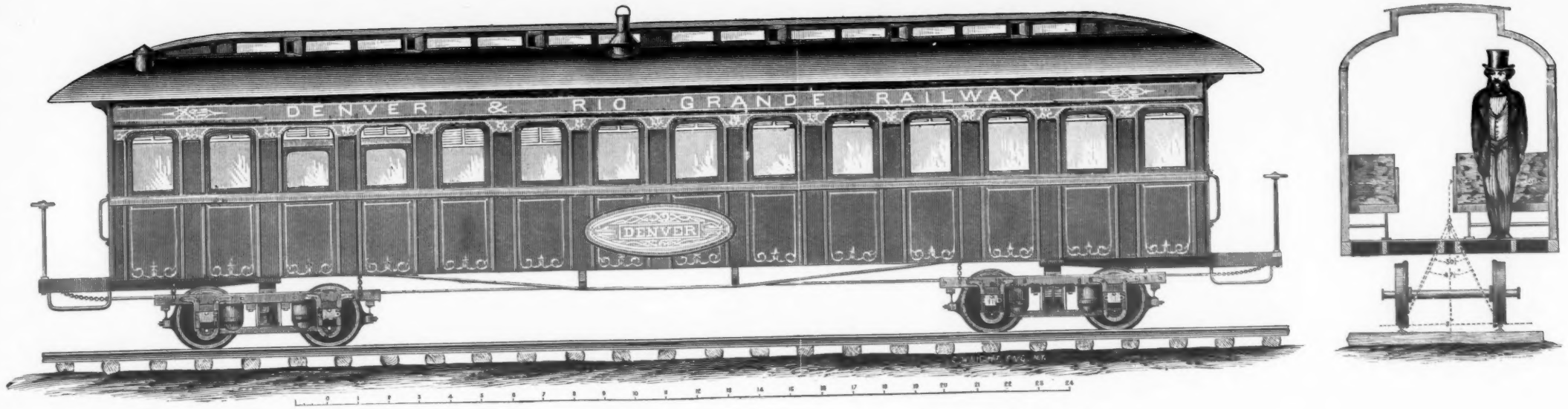
There are time-keepers, teamsters and watchmen, who, day after day, follow a prescribed routine. As regards the workmen, it is a noticeable fact that in all the workshops there are many who enter them as apprentices and have now grown gray in the service of their employers; and again it is remarkable that many of these men are kept steadily to one sort of employment, and excel only in one department. It is seldom that a mechanic is employed alternately at the vise and the lathe. If he is a good viseman, or "fitter," he is kept constantly at visework; if he is a turner, he will be employed on the lathe. We know a workman who tended a large lathe in one of the machine shops in Leeds for over thirty years; and, as might naturally be expected, no one could turn "bends" for flax-carding frames like old Tommy Whiteley. The workmen in all the different departments are kept fully employed, and materials are brought to them by laborers—a system which allows the workmen to keep steadily at work, and saves much useless running about and valuable time. To be fully qualified to receive journeyman's wages, an apprenticeship of six or seven years is indispensable. When a machinist presents himself as a candidate for employment—or, in common parlance, when he goes to ask for a job—he expects the following inquiries to be put to him: Where did you serve your time? Where did you work last? Are you a latheman or a fitter? What wages do you want?

Those who know anything of the English and Scotch character will readily perceive that there always exists among a large body of engineers and machinists in these shops an honorable pride in executing good work, an ambition to excel as expert workmen, and a rivalry as to who can turn out the most work, in the best manner, in the shortest time.—"*T. P. P.*," *in the Technologist.*

The Mont Cenis Tunnel.

The London *Times* says that the total expenses of the Mont Cenis Tunnel amounted to 65,000,000 fr.; of these 20,000,000 fr. are to be contributed by the Victor Emmanuel Railway, or Railway of Northern Italy. This sum is to be paid on or before the opening of the tunnel. The French government was to pay 19,000,000 fr. if the work was accomplished in twenty years, reckoning from 1862. But if the work was accomplished at an earlier date, France bound herself to pay 500,000 fr. more for every year gained upon the stipulated time. As there have been eleven years thus gained, France will have to pay 5,500,000 fr. besides the 20,000,000 fr. of the original stipulation. She has had to pay besides 5 per cent. interest on the money due for the work as it proceeded from year to year. Thus the charge borne by Italy in this enterprise will be something less than 20,000,000 fr., an advantage fairly gained by her diligence in carrying on the work, a diligence stimulated by the very conditions of the contract. It must be observed that had the construction of the tunnel continued beyond the stipulated term of twenty years, it was Italy that would have lost 500,000 fr. for every year in excess of that period. There was a time in which the hard quartz, with which the excavation fell in on the side of Modane, rendered it extremely difficult to foretell how long it might be before the tunnel could be terminated. Fortunately the quartz stratum was only 380 meters thick, and no very serious resistance was met elsewhere. The masonry of the tunnel is excellent throughout. No inconvenience whatever from smoke, steam or mephitic is apprehended.

UNIV. OF MICH.



NARROW-GAUGE RAILROAD CAR,

Built by the Jackson & Sharp Company, Wilmington, Delaware.

NARROW-GAUGE PASSENGER CAR.

The engraving herewith represents one of the cars built by the Jackson & Sharp Company, of Wilmington, Del., for the Denver & Rio Grande (3-feet gauge) Railway. It is made on a scale of ¼ inches to the foot; the details are taken from a photograph, and it may be relied upon as correct. These cars are 35 feet 8 inches long over the body by 7 feet wide. The height is 7 feet 6 inches from top of floor at center of car, and 5 feet 8 inches to top of plate at the side. The wheels are 24 inches in diameter, and spread 4 feet. From center to center of trucks is 25 feet 6 inches. As will be observed in the engraving, the seats are arranged for two passengers on one side and one on the other. In the front half of the car the double seats are on one side, and in the other half they are on the opposite side of the car.

In a description of these cars, published in another paper, we inferred, some time ago, that their height would not be sufficient to enable a tall man to stand up at the sides. It will be seen that, by arching the rafters, sufficient height is given to enable a man six feet high to stand erect with his hat on.

The single seats are 18 inches and the double ones 36 inches wide, and each is 30 inches from the center of one to the center of that in front or behind it. The passage way is 21 inches wide. The saloons (there are two) are 25½ by 33 inches, and the platforms 24 inches wide. The outside sills are 3¾ by 5 inches, intermediates 1¾ by 5, and center timbers 2½ by 5 inches. The axles are 3⅛ inches in diameter between the wheels; journal, 2½ inches in diameter by 5 inches long.

The cars are furnished with walnut and imitation ebony moldings, have water-coolers, with place for stove, and all the conveniences of ordinary cars. There are seats for 34 passengers, when the stove is in place, and 36 when it is removed, as it can be during a large part of the year. The weight of the car is 15,000 pounds, or 441 pounds per passenger in winter, and 416⅔ pounds in summer.

The Jackson & Sharp Company have been the first to build narrow-gauge passenger cars in this country, and have designed as comfortable a car as perhaps the 3-feet gauge will admit of. The design of the trucks is especially ingenious and well proportioned. In order to keep them as low as possible, it was desirable to place the equalizing beam below the boxes. To do this and attach them with cast iron lugs is generally considered unsafe. The boxes are therefore cast with wrought-iron bands around them to hold the equalizing beams. This supplies a very neat and secure fastening with very little expense. Thus the main sills are only 27 inches from the track, or 18 inches less than ordinary cars (the wheels being 2 feet in diameter), and, with the 3-feet gauge used, the angle of stability when empty is 50½ degrees and 47½ degrees when loaded.

The Jackson & Sharp Company now have orders for cars for the Arkansas Central, Tuskegee, and a number of other narrow-gauge railroads. They are constructing some of them on the English plan, and these will be smaller, lighter and cheaper, though not so well calculated to suit American travelers, or to run easily on our imperfect American railroads.

In this connection we publish the following letter from the Jackson & Sharp Company:

WILMINGTON, Del., September, 1871,

TO THE EDITOR OF THE RAILROAD GAZETTE:

You have been pleased to refer in your issue of 19th ult. to the subject of narrow-gauge passenger rolling stock in a manner which, to say the least, is open to criticism, and as your paper of the 2d inst. shows a disposition to make this article one of reference, we beg leave to call your attention to what we consider an oversight on your part. In the comparison instituted between the Denver & Rio Grande car and one of the New Jersey Railroad & Transportation Company's cars you failed to mention whether or not the latter, like the former, has *two saloons, a partition and a stove*, with *every* provision for the comfort of the passengers.

In summer the Denver & Rio Grande car will seat 36 passengers, instead of 34, and the dead weight per passenger becomes 416 *lbs. instead of* 441 *lbs.*

You failed also to allude to the result attained on the smoking cars of the Denver & Rio Grande Railway Company. They weighed 6,570 lbs. each and seated 22 passengers, thus giving a dead weight of 307 *lbs. per passenger.*

We have recently built a first-class car, with longitudinal seats, for the Tuskegee Railway Company. It was 30 feet in length by 6 feet 6 inches in width, and weighed 13,850 lbs. In summer it accommodates 36 passengers; the dead weight is, therefore, 384 *lbs. per passenger.*

We are so thoroughly convinced you are interested in furnishing facts like the foregoing that we take the greater pleasure in submitting them, and know full well that through the medium of the GAZETTE they will reach the minds of the more thoughtful men in the railroad community.

Very respectfully yours,
JACKSON & SHARP COMPANY.

—The directors of the Douglas County (Kansas) Agricultural and Mechanical Association have had occasion to express their thanks to O. Chanute, Superintendent of the Leavenworth, Lawrence & Galveston Railroad, for the donation of "two hundred dollars, to be appropriated by the board in such manner as may seem most conducive to the success of the fair."

Bauschinger's Indicator Experiments on Locomotives.

(Continued from page 271.)

We must now again refer to page 238 of the present volume, where the valves, together with the arrangements of the eccentrics and gear belonging to engines A, B, C, and D, are illustrated; we should, however, in the first place, correct an error which has occurred in scaling some of those figures distinguished by the affix *a*. The scale, namely, of figs. 1 *a*, 2 *a*, and 3 *a*, is 3 in. to the foot, and that of fig. 4 *a*, 1½ in. to the foot, instead of ¾ in. to the foot, as stated. As we have already mentioned, in describing the various engines (see Table I., on page 218), engines A and B are of exactly identical dimensions, except throw of eccentrics and lead; but, as will be noticed, on page 238, the valve of engine B is also provided with less inside lap than is the case in engine A. Owing to this circumstance the pre-release of engine B, as shown by the table on page 272, is considerably greater than in the former engine; it is still more in engine C, while in the case of the fourth engine, D, the valve was unequally set, so that the amount of pre-release was, of course, also unequal at the two ends of the cylinder. The two degrees of expansion, corresponding to the numbers of "notch" given in our table, are for the four engines about the same, the point of cut-off being in one case at from 50 to 60 per cent., and when cutting off short from 22 to 25 per cent. of the length of stroke. The indicator experiments on these engines show—as we have already stated—that with ample premature release, the back pressure becomes reduced to an almost imperceptible amount; also that a good pre-release is especially valuable at high speeds. In this respect, the curves taken from engine B, compare very favorably with those of engine A. It is, in fact, the good results obtained with the former engine, particularly when working express traffic, which have led Professor Bauschinger to the conclusion that inside lap may be dispensed with in the shifting-link motion. With this we agree, as an ample opening for the escape of the steam at the end of the stroke is of great importance, and with a link motion of normal proportions the outside lap of the valve assures quite a sufficient amount of compression.

We will next examine the striking effect which is produced on the back pressure by a combination of circumstances, and which is common to most engines fitted with a single blast pipe; diagrams Nos. 17 and 18, on page 239, show the effect referred to. Instead of continuing in a straight line to the beginning of compression, the back pressure line is marked by several rises and subsequent falls which caused a considerable deviation from its original level, and involve, of course, a corresponding loss of effective pressure. This condition must be attributed chiefly to the influence of the exhaust of one cylinder on that of the other cylinder, and its varying effect depends in its turn upon the form of the union pipe, the pressure of the steam at the beginning of the discharge, the amount of pre-release, and, finally, upon the nature of the discharge pipe and nozzle. In all cases where both cylinders discharge their steam through the same blast-pipe, the cylinders are, at certain parts of the stroke, more or less in direct connection with each other, so that the exhaust steam issuing from one cylinder causes an additional back pressure in the other at about the middle of its stroke.

Fig. 21 illustrates the manner in which, in engines A and B, the steam from the two cylinders is discharged

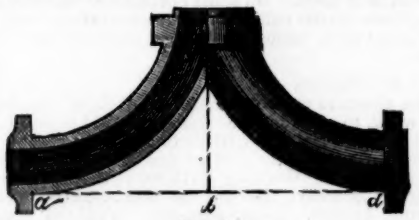


Fig. 21.

into the blast pipe, while in diagrams, Nos. 5 to 10, on page 239, the influence of the issuing steam from one cylinder is clearly marked on the back pressure of the other cylinder. In the case of engine B, this peculiarity is still more apparent, since the escape of the steam at the opening of the exhaust takes place more rapidly and producing thus a vigorous blow, as it were, from one cylinder into the other. In engine G, the two cylinders discharge their steam as illustrated in fig. 22.

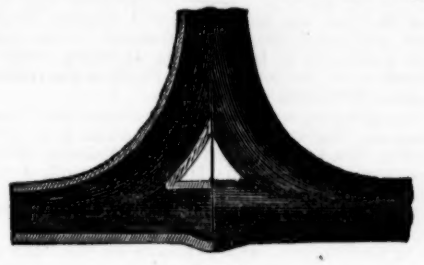


Fig. 22.

This engine, we should state, was formerly provided with a condensing arrangement, so that the exhaust was conducted by means of a branch pipe into the tender. In consequence of this, a direct communication between the two cylinders was established, which circumstance accounts for the irregularities of the back pressure lines of diagrams Nos. 17 and 18. Engine H

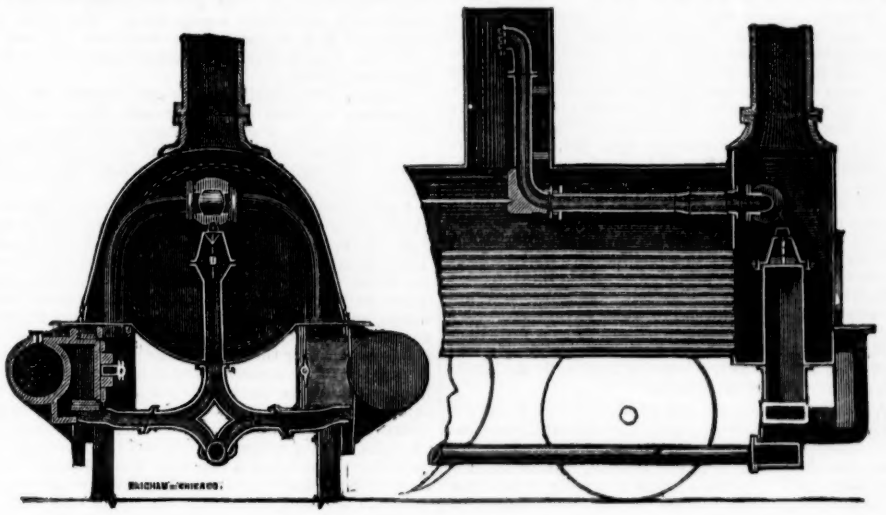


Fig. 23.

represents the only case of an engine fitted with two blast pipes, discharging, however, through a common orifice, and this is also the only case where the back pressure in one cylinder is not affected by the steam issuing from the other. It is certainly not difficult to devise proper arrangements whereby the unfavorable influence of one cylinder on its neighbor can be neutralized; the steam may be either discharged by means of two separate nozzles, as frequently employed by the Americans, and to which arrangement the case of engine H just mentioned presents the nearest approach, or a single blast pipe can be so shaped that the two discharges are kept distinct until they are close to the blast-pipe orifice.

As we formerly stated, most of the engines of the Bavarian State railways are fitted with an arrangement by means of which the area of the exhaust nozzle can be changed within certain limits, a contrivance which is very useful for producing a more vigorous draught in the boiler. On the other hand, a reduced area of the blast orifice will also materially affect the back pressure in the cylinder, since a great effort is necessary to effect the discharge of the steam. The effect of varying areas of the exhaust nozzle on the back pressure in the cylinder, is distinctly shown in the following table:

Class of engine	Reference number to diagram on page 53	Speed. In revolutions per minute.....	Speed. Speed of piston in feet per minute..	Opening of blast nozzle. In parts of total opening.....	Opening of blast nozzle. In per cent. of cylinder area.....	Pressure at beginning of release in pounds per square inch.....	Minimum back pressure in pounds per square inch.....	Minimum back pressure in per cent. of pressure at beginning of release.
A...	7	94	278	open	9.4	58	3	5.2
	5	84	336	¼ shut	7.8	52	3	5·7
	6	79	316	⅓ shut	6.2	58	8.5	14.6
	8	94	378	shut	3.0	55	10.5	19.0
G ...	17	92	366	open	12.2	70	3	6.0
	18	96	384	¼ shut	8.3	46.5	9	19.3

In the course of the trials, Professor Bauschinger also experimented on an engine fitted with Kirchweger's feed-water heater, in order to ascertain its effect upon the back pressure in front of the piston. The indicator, however, did not show any change in the back pressure line of the diagrams, no matter whether Kirchweger's apparatus was at work or not, and from these observations it may be inferred that, as regards the absolute power of the engine, it is indifferent whether the exhaust be discharged through its ordinary channel, or whether it be employed for the purpose of heating the feed-water. The manner in which the exhaust steam was taken off for heating purposes in the engine fitted with Kirchweger's apparatus, is shown in fig. 23.—*Engineering.*

—The office of John Durand, General Superintendent of the Pittsburgh, Cincinnati & St. Louis Railway, has been removed from Columbus to Cincinnati.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—J. R. Reed has been appointed General Freight Agent, and Samuel Stephenson, General Ticket Agent of the Cincinnati & Indianapolis Junction Railroad, with offices in Cincinnati. J. H. Sheldon has resigned the superintendency of that road.

—The following were chosen directors of the Toronto & Nipissing Railway Company on the 12th inst.: John Shedden, Wm. Gooderham, Thos. C. Chisholm, George Gooderham, James E. Ellis, Hugh MacDonald, Joseph Gould, H. P. Dwight and Wm. Copeland. John Shedden was re-elected President and Wm. Gooderham, Vice-President.

—On the 13th inst., what is known as the "General Council" of the Louisville & Nashville Railroad Company selected the following as directors for the ensuing year: Jno. G. Baxter, E. D. Standiford, B. F. Guthrie, J. H. Lindenberger, R. A. Robinson, W. B. Caldwell, James Whitworth, S. P. Walters, J. B. Briggs. All of these, we believe, except Mr. Whitworth, whose home is in Nashville, are residents of Louisville. Only three of them, Messrs. Robinson, Caldwell and Whitworth, are members of the present board. This selection is yet to be approved by the stockholders. The Louisville *Courier-Journal* says of the election: "To those who may not be acquainted with all the circumstances which have led up to the foregoing result, it may be proper to state that it involves the election of John G. Baxter, the present Mayor of Louisville, as President of the Louisville & Nashville Railroad, in place of Mr. H. D. Newcomb. It is only stating a fact of almost universal knowledge, that Mr. Newcomb's administration has been signally unsatisfactory and unpopular. The vote of the General Council merely prefaces the sanction of the stockholders. It is not likely that there will be so much as a contest. There will doubtless be considerable feeling in Louisville at the loss of its Mayor. There is a feeling here that we have never had so efficient a Mayor as John G. Baxter. He is a hard-working, thorough-going, sagacious and upright man of business, an admirable executive and a safe financier, who has done more for us in a year than most men would have done in a decade. The city will feel his loss, undoubtedly; but the Louisville & Nashville Railroad will be the gainer."

—W. B. Shattuc, for several years General Southern Agent of the Erie Railway, with headquarters at Cincinnati, has been appointed General Ticket Agent of the Atlantic & Great Western Railway under its new independent management. This virtually continues Mr. Shattuc at the work which he has been doing for years, of course with added powers and responsibilities.

—Mr. H. J. Gleason has for the past year been Ticket Agent of the Chicago, Rock Island & Pacific Railroad at Council Bluffs, and has lately been transferred to the Purchaser's Department of the same company, at Washington, Iowa.

—Mr. W. H. Vandegrift, lately Train Dispatcher of the Indianapolis, Cincinnati & Lafayette Railroad, has been appointed Assistant Master of Transportation of the same company.

—The directors of the Topeka & Fort Scott Railroad Company met at Fort Scott on the 11th of September and elected the following officers: H. T. Wilson, President; E. P. Higby, Vice-President; Geo. A. Crawford, Treasurer; B. F. Hepler, Secretary. It was voted to employ Captain T. L. Wilson as General Manager of the company.

—At an election of directors of the Monticello & Port Jervis Railroad Company, in Port Jervis lately, the Erie managers, who had purchased a controlling amount of stock, elected several of their number to the Board of Directors, namely: James Fisk, Jr., Jay Gould, Justin D. White, L. D. Rucker, Geo. S. Hall, Geo. S. Redington, H. N. Otis. The road has been run as a branch of the Erie during the past year.

—S. H. Thompson has been appointed Eastern Passenger Agent of the Missouri Pacific and the Atlantic & Pacific railroads in place of J. G Hill, resigned. Mr. Hill's headquarters will be at Columbus, O.

—The directors of the Lockport & Buffalo Railway Company met last week and elected the following officers: Hon. Hiram Gardner, President; Benj. H. Fletcher, Vice-President; Silas H. Marks, Treasurer, and Joseph A. Ward, Secretary.

—At a meeting of the stockholders of the Detroit, Lansing & Lake Michigan Railroad Company, on the 19th inst., the following directors were elected: Henry A. Whitney, Nathaniel Thayer, Wm. T. Weld, John A. Burnham, Geo. O. Shattuck, John W. Brooks, Charles Young, of Massachusetts; H. Rich, Wm. B. Wesson, H. H. Smith, James F. Joy, of Michigan.

—Gen. Alfred Pleasonton, late Commissioner of Internal Revenue, was chosen President of the Cincinnati & Terre Haute Railroad Company on the 21st inst. in place of N. M. McDowell, who remains with the company as Chief Engineer.

TRAFFIC AND EARNINGS.

—We do not often go to Spain for lessons, but the following statement of the working expenses of one of the railroads of that country, the Madrid, Saragossa & Alicante, indicates that we might learn something there: "In 1867 the proportion of the working charges to the traffic receipts was 47.88 per cent.; in 1868, 44.40 per cent.; and in 1869, 44.87 per cent. Last year it was brought down to 39.80 per cent."

—The traffic receipts of the Great Western of Canada for the week ending August 25 amounted to £18,285, against £14,309 in the corresponding week of last year, showing an increase of £3,976, or 27¾ per cent.

—The traffic receipts of the Grand Trunk of Canada for the week ending August 26 amounted to £33,000, against £30,300 in the corresponding week of last year, showing an increase of £2,700, or 9 per cent.

—Since the Central Pacific Company acquired the California Pacific Railroad and the Steamboat line between San Francisco and Sacramento, the following advances in fares have been made: By the Western Pacific, 137 miles, from Sacramento to Oakland, from $2.50 to $4, which is 60 per cent. increase. By the steamer from Sacramento to San Francisco, $1.50 to $2.50; an advance of $1, or 66⅔ per cent. By the railroad to Vallejo and boat from Vallejo to San Francisco, from $3 to $4; an advance of $1, or 33⅓ per cent. It is reported that an average reduction is to be made by the company on the wages of its employes of 27½ per cent.

OLD AND NEW ROADS.

Lake Shore & Michigan Southern.

The committee of directors to whom the manner of increasing the stock was referred have determined upon the following plan: "On the existing capital of $35,000,000 a stock dividend of 40 per cent., amounting to $14,000,000, is made, and the provision that 33⅓ per cent. of the amount shall be paid in cash. This will increase the capital to $49,000,000, and give the company $4,666,657 in cash for the completion of double track and necessary equipment. The cash will be called up in installments, as required, and when 33⅓ per cent. has been paid the scrip certificates will be exchanged for full paid stock.

From a letter in the New York *Express* we take the following account of the branch from Ashtabula to Jamestown, Pa., which this company is constructing to unite with its main line the railroad from Jamestown to the coal regions at Franklin, which it has owned for some years:

"Ashtabula is one of the pleasantest villages on the Western Reserve, and is situated three miles south of Lake Erie, and one mile south of the Lake Shore road. The harbor of Ashtabula is considered one of the best on Lake Erie, the government within the past two years having expended a good-sized appropriation in deepening the channel at the mouth of the river by excavating the rock and widening the channel, so that in the lowest water there is a depth of thirteen feet, and is capable of accommodating the largest vessels on the lake. Ashtabula harbor is on the direct line of the south shore of the lake between Buffalo, Chicago and Detroit. It is as near either of those Western cities as Cleveland, fifty miles further west. The Lake Shore road is now building a railroad from Jamestown, Pa., to Ashtabula harbor, where they have recently secured over 120 acres of land along the river and harbor, on the east side, on which to construct docks and other improvements to accommodate the commerce that is destined to center at this harbor from the West.

"The Jamestown & Ashtabula Railroad is destined to reach and secure the oil from the oil regions, and give the Lake Shore an independent line to that locality, and to cut off some thirty-four miles of transportation on a line beyond their control, which they are now subjected to, to secure the oil for transportation to the seaboard East."

Chicago, Burlington & Quincy.

As was announced some weeks since in these columns, this company is extending the Mendota & Prophetstown Branch to Clinton, to connect with the Chicago, Clinton & Dubuque road, making, by it and the Chicago, Dubuque & Minnesota road, a new route from Chicago to Minnesota. The contract for grading, tieing and ironing the extension from Prophetstown to Clinton—about 20 miles—has been let to Messrs. Grinnel, Wolf & Carpenter, to be completed by the 1st of January next.

This company, in addition to its cash dividend of 5 per cent., September, 1871, proposes to issue new stock, at par, to the extent of one new share for every eight old ones, to stockholders of record September 15. The option will be good until October 1 to take the stock, which is made payable in three equal installments on the 1st of October, November, and December, with the privilege, after September 15, of anticipating payments and receive 6 per cent. interest. A circular to the shareholders states that—"having expended, as our annual report shows, a considerable sum on our road and branches beyond our surplus earnings, and there being an indispensable necessity for the immediate completion of a double track between Chicago and Aurora, to accommodate the large traffic between these points, amounting to nearly one hundred trains a day, and an urgent need of other facilities for doing our constantly increasing business"—new stock was voted as above stated.

Cincinnati & Springfield.

The contractors, Messrs. Snell & Taylor, have found some extraordinarily heavy work on this "Short Line." The grading and masonry is now about half done and will be entirely completed this year. There are now 1,000 men at work. On some portions of the line there have been 100,000 cubic yards of excavation and embankment to the mile and much of this has been rock work.

Dakota & Northwestern.

The directors met at Vermillion, Dakota Territory, last week, to consider the securing of aid to grade the road from the Big Sioux River to Yankton. The following estimate of the cost of this much of the road was submitted: Grading, $113,000; tieing, $86,000; bridging, $56,000; discount on bonds, $20,000; engineering, $10,000. Total, $285,000. Yankton County has already voted $200,000 in bonds.

Illinois Farmers' Railroad.

This railroad, which was completed last year from Jacksonville southeast to Waverly, has been located lately from Waverly southeastward twelve miles to Virden, on the Chicago & Alton Railroad.

Illinois Central.

The statement of this company for the month of August, 1871, is as follows:

LAND DEPARTMENT.		
Acres construction lands sold	3,534.90 for	$35,610 50
Acres interest fund lands sold	.....	.....
Acres free lands sold	120.00 "	2,591 60
Total sales during month of August, 1871	3,654.90 for	$38,202 10
To which add town lot sales		95 00
Total of all	3,654.90 for	$38,297 10
Cash collected in August, 1871		$127,722 03

ESTIMATED EARNINGS—TRAFFIC DEPARTMENT.

	In Illinois, 707 miles.	*In Iowa, 402 miles.*	*Total, 1109 miles.*
Freight	$497,139 00	$82,420 00	$579,559 00
Passengers	124,262 38	39,112 35	163,374 73
Mails	6,375 00	3,059 33	9,434 33
Other Sources	79,000 00	2,940 67	81,940 67
Total, August, 1871	$706,776 38	$127,532 35	$834,308 73
Total actual earnings, Aug., 1870	753,566 94	145,484 54	899,051 48

This shows a decrease of $46,790.56, or about 6¼ per cent., on the Illinois lines; of $17,952.19, or 12⅓ per cent., on the Iowa lines; and of $64,742.75, or 7 per cent., on the entire mileage.

Chicago & Alton.

The iron is now going down very rapidly on the Louisiana Branch, between Roodhouse and Louisiana, since the completion of the Illinois Bridge, and will probably be ready for the passage of trains early in October.

The earnings for the first two weeks in September show a decrease of $5,929.18, nearly 2½ per cent. In 1871, $245,210.26 and in 1870, $251,139.44.

Chicago & Southwestern.

The Chicago, Rock Island & Pacific Company will take possession of and operate the entire line of this road, under lease, from Washington to Leavenworth, on the 1st of October The distance from Chicago to Leavenworth by this route is 529 miles. The passenger fare to Leavenworth is to be $20.00, the same as fare by other routes to Kansas City. To Cameron, on the Hannibal & St. Joseph road, the fare will be $17.80.

Lockport & Buffalo.

The directors of this company met in Lockport last week and resolved to accept the proposition of the Erie Railway Company, an account of which was published in these columns some weeks since. The Erie Company is to lease and operate the road in perpetuity.

Milwaukee & Nashua.

President Greeley expresses his "hopes" that twenty miles of grading will be done this year; that the contract from Ames southwest to Des Moines will be let at once; and that the grading in Chickasaw County, from Chickasaw Station to Shell Rock, will be done this season.

Penobscot & Union River.

The town of Bucksport, Me., has voted $65,000 for this road, and private subscriptions in the same town amount to $83,000.

West Wisconsin.

The track-layers are at work between Menomonee and Hudson and already have about twelve miles of iron down. Between St. Paul and Hudson it is expected the road will be completed by the middle of November, and by the 1st of December the line will probably be in operation to Menomonee.

Indianapolis Union Depot.

A meeting of the managers of all the railroads leading to Indianapolis was held there on the 21st, in reference to the enlargement of the present union passenger depot, or the erection of a new one.

Wisconsin Central.

The bridge for this road over the Wolf River, about 18 miles west of Menasha, is completed.

Leavenworth & Southwestern.

At the next general election, Leavenworth County, Kan., will vote on a proposition to build a railroad from Leavenworth to a point of intersection with the Atlantic & Pacific road, in the Indian Territory. The subscription asked for is $150,000 in bonds, and $300,000 in stock of the county in the Chicago & Southwestern Railway.

Quincy, Alton & St. Louis.

It is intended to have this railroad completed to a point opposite Louisiana, Mo., by the middle of November.

Narrow Gauge.

The Pittsburgh *Iron World* says: "New York capitalists are now building a three-foot gauge railroad from Painsville to Chardon, Warren and Niles to Youngstown.

"Another company is organized to build a 3-foot gauge from Leetonia to Hazleton, the greater portion being now graded and ready for the iron.

"Brown, Bonnell & Co. and the Nimrod Furnace Company are building a 3-feet gauge railroad from Youngstown to Hubbard (10 miles). It is all graded and ready for the iron. It will be chiefly used for transporting their own coal which has heretofore been transported over the Hubbard Branch."

Quincy, Missouri & Pacific.

About seven-eighths of the grading for this road between West Quincy and Edina, 40 miles, is completed, and a few miles of track laid out of West Quincy.

Lafayette, Bloomington & Mississippi.

All the iron for this road from Bloomington east to the Indiana State Line is now on hand, or on the road, and 15 miles are already laid.

Atchison, Topeka & Santa Fe.

One of the officers of this company writes to us that proposals for grading and masonry on this road from from Parnell Junction, on the Central Branch Union Pacific Railroad, 6½ miles from Atchison, to Topeka were opened May 26, and contracts for 15 miles from Parnell Junction south and 10 miles north from Topeka were awarded. The remaining 18 miles have been let at different times since. Twenty-five miles will be ready for track-laying by October 1st, and the remainder before the track reaches it. All the work being done is first-class. No wooden substructure will be used in any situation. Depots and water-tanks are permanently located with substantial masonry foundation. Excepting one iron bridge, furnished by the King Bridge Company, the bridges are to have wrought-iron bottom chords, which, by proper protection of the upper chords, make a structure nearly as permanent as an all iron bridge. The General Manager, Mr. T. J. Peters, invites proposals to be opened October 5 for the completion of track-laying from Parnell to Topeka by December 15, 1871.

The company contemplate building immediately an independent line into Atchison, which will make the total distance from Topeka to Atchison 49.7 miles. The road is now in operation to Newton, 132 miles from Topeka, and is located 115 miles beyond, on which work will soon commence.

St. Paul & Pacific.

A. Degraff & Co., who have been grading the main line of this road to Breckinridge, having finished that work have transferred their forces to Sauk Rapids and commenced grading the extension of the Mississippi River Branch of that road from Watab to Brainerd.

Missouri, Kansas & Texas.

A Sedalia correspondent of the St. Louis *Democrat* says the company propose building a branch from Green Ridge—about 12 miles west of Sedalia—a little north of westward to Holden, there to connect with the Missouri, Kansas & Texas Company's Holden Extension, several miles of which is completed. The surveys and estimates for the new branch are completed, and are now under examination.

Baltimore, Pittsburgh & Chicago.

The Pittsburgh *Post* says an engineering party, under Mr. Chas. Auchenhile, has commenced the final location of this line from Pittsburgh westward, and expects to reach the Ohio line by the 1st of November.

Liberty to Ashtabula.

The Pittsburgh *Iron World* says that five miles of the road between Liberty and Vienna, Ohio, have been purchased and a company formed to continue it on to Niles, Warren, Bloomfield and Ashtabula.

Connecticut Air Line.

A circular has been addressed to the creditors of the Connecticut Air Line Railroad Company, urging them to agree to a settlement of their claims for one-half second mortgage bonds guaranteed by the towns, and one-half unguaranteed; otherwise, it argues, the road will shortly pass into the hands of the first-mortgage bondholders, every dollar of the unsecured claims will prove a total loss, and the completion of the road will be indefinitely postponed.

Connecticut Western.

This road is nearly finished, and by Thanksgiving day, at the farthest limit, the managers agree to run their trains to and from Hartford, the entire length of the road.

Chicago, Clinton & Dubuque.

The grading on this line in Iowa is done from Dubuque south to within ten miles of Sabula, and will, it is expected, be finished to Clinton by November. Bridges are in course of construction over the Catfish and Maquoketa rivers, and the track will probably all be laid this year.

Northern Central of Michigan.

This road, which was formerly known as the "Ramshorn," and which was partially graded a number of years ago, is now in a fair way of completion. Work was commenced at Jonesville on the 30th ult., and shortly after at various other points on the line, and is being rapidly pushed forward. The road is to extend from Jonesville northward through Litchfield, Homer, Albion and Eaton Rapids to Lansing, the capital; and it is intended eventually, to extend it to the Straits of Mackinaw. The citizens along the line are required to grade the road and put in the culverts, after which the Lake Shore & Michigan Southern Railway Company will build the large bridges, put on the ties and iron, when it will become a branch and the property of that road. The length of the line from Jonesville to Lansing will be about 55 miles. It will cross the Air Line of the Michigan Central at Homer, the main line at Albion, and the Grand River Valley division at Eaton Rapids.

Pacific of Missouri.

Arrangements have been made for running Pullman cars over this line hereafter, and a faster train has been put on, making the run from St. Louis to Kansas City in eleven hours. The Goodale steam brake has been adopted for general use.

Pennsylvania Railroad.

The Philadelphia *Post* says: "The Pennsylvania Railroad Company use on the main line, between that city and Pittsburgh, 482 engines, 693 passenger cars, 6,632 freight cars, 731 coal cars, 96 baggage, mail and express cars. These are the property of the Pennsylvania Company. In addition to these there are now on the road, 4,877 eight-wheeled cars not owned by the company. The road crosses 150 iron bridges, the total length of which is 13,960 feet; thirty-nine wooden bridges, with a total length of 8,977 feet, and seventeen stone bridges of 24-feet span and upwards. It penetrates 8 tunnels, the shortest one being 200 feet in length, and the longest 3,612 feet.

Sheboygan & Fond du Lac.

A correspondent writes us from Dartford, Wis., under date of the 17th, as follows:

"The preliminary survey of the extension of the Sheboygan & Fond du Lac Railroad is completed, and the line located as far as Princeton. Construction commenced a little over a week ago, and now the contractors are at work at different points along the whole line of 35 miles. The contract for the whole road has been awarded to Wells, French & Co. Mr. J. F. Murrell, Chief Engineer during the survey, remains in charge as chief during the construction. Whether spring will see the survey pushed still further west is as yet undecided."

Dubuque & Monroe.

Efforts are being made to secure subscriptions for a road from Dububue eastward to Monroe, Wis., there to connect with the Milwaukee & St. Paul Railway. Such a road would complete a short route between Milwaukee and Dubuque.

Indianapolis, Cincinnati & Lafayette.

The argument in the case to force the Indianapolis, Cincinnati & Lafayette Railroad into bankruptcy has been deferred by Judge Gresham until the 16th day of October.

North Missouri.

Several more suits have been filed against the North Missouri Railroad Company—one by James Low, for $100,000, due in promissory notes, drawn in favor of the St. Charles Bridge Company, and several individuals; one by E. W. Fox, on a note for $23,000, and one by George D. Humphreys, for $14,' 00.

Boston, Saratoga & Oswego.

A meeting was held in Saratoga, on the 12th inst., to consider the expediency of constructing this road. Mr. E. H. Derby, of Boston, advocated it with a great show of statistics.

Sabula, Ackley & Dakota.

The Maquoketa (Iowa) *Sentinel* says: "Work on the Sabula, Ackley & Dakota Railroad is progressing rapidly. Some twenty-eight miles of iron are now down, and five miles more will bring the track-layers to Delmar Junction. It is pretty strongly hinted by those who ought to know, that, when the road reaches Delmar, trains will be run into this city, an arrangement to that effect having been made with the Dubuque & St. Paul Company." The road was completed last winter to Preston, 20 miles from Sabula.

Iowa Southwestern.

Engineer Irish informs the Iowa City *Republican* that grading on the Iowa Southwestern is being done east of Tipton at the rate of a mile a day, and will soon be done much faster. He is confident that track-laying will be in progress in Johnson County in November.

Decatur, Sullivan & Mattoon.

The track is laid on this road to a point 18 miles northwest of Mattoon and five miles beyond Sullivan. The road is graded to Marrowbone, a few miles further. The road is thus about one-half completed.

Burlington & Missouri River.

This company sold 3,546 acres of land during the month of August at an average price of $12.75 per acre. It has yet 210,000 acres for sale.

Des Moines & Indianola.

The Des Moines (Iowa) *Register* has the news that the iron for the unfinished portion of the Indianola Railroad has been received, and that track-laying has commenced, and be continued until the road is completed to Indianola, probably within a week.

Union Pacific.

A telegram from Council Bluffs dated the 21st says: "Omaha City has refused to deliver to the Union Pacific Railroad Company $250,000 of her bonds, which she agreed to give for the location of the bridge where the same is now being built. She also refuses to execute a deed for the local depot grounds. The bridge is progressing rapidly, and the company will soon commence work on their passenger, freight, and transfer depot at Council Bluffs."

Sturgeon Bay & Lake Michigan Canal.

This projected work is a ship canal only a mile and a quarter in length, to extend from the head of Sturgeon Bay (which extends from Green Bay at a point about 40 miles south of its outlet, and as far from its head eastward directly towards Lake Michigan) eastward to Lake Michigan, thus giving an outlet to all vessels going southward much shorter than the natural one, and saving nearly one hundred miles in the distance from Sturgeon Bay and points further south on Green Bay to Milwaukee and Chicago. Immense quantities of lumber are shipped from points on Green Bay, nearly all of which goes eastward, and this saving in distance and the avoidance of the difficult navigation at the entrance of Green Bay (known as "Death's Door") are advantages which it is believed will warrant the construction of the canal. Moreover, Congress has granted 20',000 acres of land in aid of the project. A careful survey has been made for the work, and the company hopes to be able to let the contract for its construction soon. Among the present directors are William B. Ogden, J. Spalding, F. B. Gardner, T. H. Beebe, Anson Eldred, C. D. Robinson, J. Harris, and Abner Kirby, most of whom are interested in the lumber trade. W. T. Casgrain is Chief Engineer. A meeting of stockholders will be held in Green Bay, Wis., October 13, to elect a new board of directors.

Jefferson City, Lebanon & Southwest.

Mr. J. Ed. Belch, President, at Jefferson City, Mo., advertises for proposals for the grading and masonry of about seven miles of the road. Proposals will be received up to the 9th of October, either for the whole work or for sections of one mile each; and either for cash or for payment in the bonds of Cole County.

The Omaha & Council Bluffs Bridge.

The Council Bluffs (Iowa) *Nonpareil* says the columns of the Union Pacific bridge over the Missouri at that point, are now all down to the rock foundation, and filled with concrete masonry to a point above high-water mark. On the west side of the river two piers are completed, and ready for the superstructure. The first span of the bridge—reaching from the stone abutment to the first pier on the west side of the river—is nearly completed, and workmen commenced putting in the second span of the bridge this week. With favorable weather, six months ought to suffice to complete the whole structure ready for the passage of trains.

Peninsular of Michigan.

Regular trains commenced running on this railroad between Lansing, Mich., and South Bend, Ind., on the 11th inst. The Peninsular connects at Charlotte with the Grand River Valley Railroad; at Battle Creek with the Michigan Central; at Brady with the Grand Rapids & Indiana; at Schoolcraft with the Kalamazoo Division of the Lake Shore & Michigan Southern; at Cassopolis with the Michigan Air Line, and at South Bend with the Lake Shore & Michigan Southern.

The New Jersey Lease.

At the hearing of the suit for an injunction prohibiting the lease of the property of the United Railroad Companies of New Jersey to the Pennsylvania Railroad Company, John P. Stockton, Esq., arguing against the injunction, made the following points:

1. There is no charge of fraud, and the question of wisdom or expediency of the proposed lease is, I submit, one neither for the court nor counsel. As a large majority of the board and two-thirds in interest of the stockholders favor it, the probability is that, as a pure financial movement, it is a good one.

2. The question of the power of the Pensylvania Railroad to take the lease, I do not deem properly before us, nor can it be properly argued at this time before the court for two reasons, which will appear in the course of my argument.

3. I do not consider the question whether compensation has been "first made" in the act of 1870, whether the meaning used in the Constitution is a question in this case, as I hope to make it appear that there is no property "taken."

The closing argument in the suit for an injunction was made at Trenton on the 21st by Judge Black, of Pennsylvania. The opinion of the court was reserved till the October term.

New French Railroads.

An English paper gives the following news:

"The Paris, Lyons & Mediterranean opened lately its line from Chalon-sur-Saone to Dole. The commencement of traffic upon the section has been delayed by a scarcity of available rolling stock. The Northeastern of France is energetically prosecuting the works of its line from Boulogne to St. Omer.

"The Paris, Lyons & Mediterranean is completing its approaches to the Mont Cenis Tunnel. In the course of last year some works on the section from the Rhone to St. Michel were reconstructed or consolidated. Between St. Michel and the Mont Cenis Tunnel, a distance of about 13 miles, the works commenced in 1869 were continued last year, so that the section is expected to be ready for traffic nearly as soon as the tunnel, that is, towards the close of this month (August).

"The works of a new line from Lyons to Montbrison are about to be commenced. This new line will be 48¾ miles in length, and it will pass through 33 communes, of which 21 belong to the department of the Rhone and 12 to the department of the Loire."

Atlantic & Lake Erie.

The New Lexington (Ohio) *Herald* says: "We learn that all the remaining sections on the line of this road between this point and Hartford, Licking County, will be sub-let on the 30th inst., at Granville, and the work proceeded with at once. J. M. Ashbrook, Esq., and Mr. Rarick, of Fairfield County, have taken the contract from Bremen to Pleasantville—some thirteen miles—and commenced work on their job this week. Stafford & Homan have put a force on section No. 1 south of this place with the intention of completing the grade between here and the Briar Ridge Tunnel at once. We are informed that it is the design of the company and the contractors to make an effort to substantially complete the grade from the nearest coal mines south of here to Hartford before the commencement of winter."

Toronto & Nipissing.

This narrow-gauge (3-feet 6-inch) railroad was opened as far as Uxbridge, 41 miles from Toronto, on the 14th inst. It is expected to have it completed to Woodville, 64 miles from Toronto, this season, and to its terminus at Coboconk early next summer. In his annual report the Chief Engineer, Mr. Edmund Wragge, gives the following statement of cost:

"Actual cash cost of construction from Scarboro Junction to Uxbridge, when finished, 32 miles, $402,250, equivalent to a sum of $12,570 per mile. Out of this sum an amount of $230 per mile is properly chargeable to renewals, being the amount paid as a seven years' guarantee on the rails. This reduces the cost to $12,340 per mile. As regards the equipment, it is estimated that an outlay of $3,000 per mile in cash will be required to fully stock the road to Coboconk. This is more than was originally estimated, but is a matter of congratulation to the proprietary that they will have a traffic which will necessitate the supply of more rolling stock than was anticipated.

"Adding the cost of equipment to that of construction, we have a total cost of $15,340 per mile in cash, as against the estimate of $15,000."

Lafayette, Muncie & Bloomington.

On this road—which was intended as the continuation in Indiana of the Lafayette, Bloomington & Mississippi road to Muncie, Ind.—the grading is well under way, and will be done by the 1st of January next.

Ashtabula, Youngstown & Pittsburgh.

Of this railroad a correspondent of the New York *Express* says:

"The Ashtabula, Youngstown & Pittsburgh road is is now under contract, with the work now progressing. They also have some forty or more acres on the west bank of the river at the harbor (Ashtabula), and have more than one mile of frontage on the river, where they are building docks, storehouses and other conveniences for the pocketing of coal and iron ore, so that a vessel can be loaded with coal in two hours, and unloaded of iron in from six to twelve hours, by steam. An elevator will also be constructed by this company to accommodate the large amount of grain from the West that will be taken in the cars for Pittsburgh, Youngstown, Niles, Vienna, and other iron manufacturing places in Eastern Ohio and Western Pennsylvania, and for Baltimore *via* Pittsburgh and the Baltimore & Ohio roads. One fact should be borne in mind in estimating the advantages of this locality and its easy and safe harbor, that is, it is as near Baltimore by rail as Erie is to Philadelphia, or Buffalo to New York. The Ashtabula & Youngstown road is one of the most important in this section of the State. It taps the four great trunk lines of road between the West and the Atlantic seaboard—the New York Central and Lake Shore at Ashtabula, the Pennsylvania Central and the Baltimore & Ohio at Youngstown and Pittsburgh, and the Erie and Atlantic & Great Western at Warren, Ohio. This will give the business at Ashtabula harbor and all the country between to Youngstown, a distance of only sixty miles, the advantage of a choice in the four lines for an eastern transport. This line from Ashtabula to Pittsburgh, *via* Warren and Youngstown, is like the Mohawk Valley, between Lake Erie and the Hudson River—it was the Indian trail, when the Indians traveled, to go from Lake Erie to the Ohio River. It is the natural route, and a very level one, there being no grades on the Ashtabula & Youngstown road exceeding sixty feet to the mile, and that only for a distance not beyond half a mile in length. This road has already five and a half miles completed north of Youngstown, that connects by side tracks with most of the furnaces, and nine miles further will bring it to Warren, thirty-two miles south of Ashtabula harbor. It is graded, or nearly so, and will receive the iron this fall. This road penetrates the best coal fields of Ohio, and will be connected with and in close proximity to blast furnaces where nearly one-fifth of the iron in the United States is now made."

Cumberland Valley Railroad.

The Hagerstown *Mail* has the following with regard to the work on the Cumberland Valley road between Hagerstown and Williamsport: "The work of laying the rails upon the extension of the Franklin (a continuation of the Cumberland Valley) Railroad from Hagerstown, to Powell's Bend, on the Potomac river, is being vigorously executed under the direction of the Chief Engineer of the Company, Major Edward Watts. The graduation of the road, under the supervision of Major Watts, was executed by Mr. James March, a thorough railroad man, and is said to be a model piece of workmanship. Mr. March is now engaged on the filling and excavation of that portion of the same line which extends into Virginia, known as the Martinsburg & Potomac Railroad, and the Chief Engineer is, we understand, arranging his plans for the construction of the bridge across the Potomac River We anticipate that a very few months will be permitted to pass before this road, or a portion of it, at least, will be open to the public. When completed it will be one of the most substantially constructed railways in the United States."

North Shore Railway of Canada.

A Quebec journal has a list of sums which has been voted in aid of this enterprise by the people of the respective localities named: City of Quebec, $1,000,000; Town of Three Rivers, $100,000; County of St. Maurice, $100,000; County Maskinonge, $100,000; County Joliette, $80,000; County Montcalm, $100,000. Total, $1,480,000. The following municipalities have passed by-laws not yet submitted to popular vote: Boisseauville, a suburb of Quebec, $25,000; County Champlain, $100,000; County Berthier, $100,000; Town of Joliette, $20,000; County Portneuf, $100,000. Total, $345,000. The authority just quoted says that the last-mentioned rates will in all probability be indorsed by the elections in each case. Assuming that as true, the company will be in possession of funds and municipal bonds to the amount of $1,825,000. Additional from Montreal and some other municipalities is still expected. The line is 200 miles long, extending along the north bank of the St. Lawrence between Quebec and Montreal, besides the Piles Branch, and the company are bound in the terms of their land grant to establish a line of steamers upon the St. Maurice River. So soon as the road is in order a large land grant made by the Quebec Government, and estimated to be worth $4,000,000, will be available. It is said that American capitalists are prepared to take hold of the enterprise on the basis of the assets just enumerated, and the company therefore expect soon to commence the work of construction. The 4-feet 8½-inch gauge has been selected.

Calumet Railroad.

The Calumet & Chicago Canal and Dock Company advertises for proposals for grading five miles of railroad. The specifications are at the company's office, No. 174 La Salle street.

Decatur & State Line.

The location of the north end of the road has been changed so as to meet the Rock Island road at Bremen, instead of Mokena—6 miles nearer Chicago. We learn that it will be ready for operation from Bremen to the Kankakee River by the 1st of January next. Mr. Ben. Bruce, of Marseilles, Ill., has the contract for the masonry of the Kankakee River Bridge. The contract for grading and bridging for about 40 miles, from the river south to Chatsworth, was let this week—to be completed this year.

Auburn & Deposit.

Articles of association of the Auburn & Deposit Railroad Company have been filed in the office of the Secretary of State at Albany. This road is to be constructed from Deposit, Delaware County, to Homer, Cortland County, N. Y., a distance of 60 miles, through the counties of Delaware, Broome, Chenango, and Cortland. The capital stock is $1,000,000, divided into 10,000 shares. It is intended to begin the road at once, and to complete it as soon as possible.

Baltimore & Philadelphia.

The Baltimore *Sun* says that Col. S. R. Johnson, with a corps of engineers, is surveying a route for a new railroad between Baltimore and Philadelphia, under the direction of the Baltimore & Ohio Company.

Washington & East Alexandria.

A certificate of incorporation under the act of Congress of May 5, 1870, has been filed and recorded in the office of the Recorder of Deeds for the Washington & East Alexandria Railroad Company, for the purpose of constructing a railroad between the cities of Washington, in the District of Columbia, and Alexandria, in the State of Virginia. The certificate recites that $50,000 worth of stock has been subscribed for and ten per cent. paid in, and that the purpose of the company is to locate and construct and operate a railroad for freight, passengers and the United States mails between the cities named. The capital stock is to be $100,000, in shares of $100 each, and the number of directors is fixed at seven, as follows: Isaac Miller, Brooklyn; Gideon S. Walker, Jersey City; George S. Wilcox, Brooklyn; Henry Randall, New York City; Edwin L. Brady, Jersey City; J. W. Lamson, Brooklyn—each one hundred shares; John N. Stoddard, New York, ten shares.

Pittsburgh & Connellsville.

The Cumberland (Md.) *News* says that on Monday, the 3d inst., trains passed safely through Brooke Tunnel on the line of the Pittsburgh & Connellsville Railroad. The *News* adds:

"The connection is now complete, by easy grade, over the entire length of road, Brooke Tunnel being the last piece of work unfinished at the time of the formal opening. This tunnel has been christened "Shoo Fly" by the hands at work there, and the passenger on a train of cars going over the summit of the hill was pretty sure to retain a vivid impression of the flight, and although the "Shoo Fly" crossing is now no more, a remembrance of its perilous looking trestlings, short curves and fearful precipices will live in the memory of every person traveling over its summit. The passage through the tunnel is but about sixteen hundred feet, and is made in about one minute. The completion of the tunnel greatly facilitates travel and trade over the road, as all the trouble and delay occasioned in crossing is at last removed."

RAILROAD LAW.

Railroad Companies Responsible for Want of Skill and Prudential Foresight in Selection of Machinery and General Management of their Franchises.—*Explosion of steam engine presumptive evidence of negligence.*

From the reported case of *The Illinois Central Railroad Company vs. Phillips*, we take the following rulings:

An engine boiler exploded in the Union Depot at Chicago, injuring Phillips—not a passenger—who brought suit. At the trial below the following instruction was offered by the railroad company, and refused by the court:

"If the jury believe, from the evidence, that within a reasonable time before the explosion of the boiler in question, the defendants made a careful and thorough examination of the engine and boiler, by skillful and qualified mechanics in that branch of business, and that the same was then in sound and good condition, and so continued up to the time of explosion, so far as could be discovered; that there was at the time of the explosion a proper quantity of water in the boiler, and only an ordinary amount of steam, and that said engine was under the management of a careful and skillful engineer, and that the explosion was from causes which could not have been ascertained by any known and recognized means, then the injury, if any, to the plaintiff, must be borne by him, as one of that class of injuries for which the law affords no redress, and the jury should find for the defendants."

Upon this the Supreme Court of Illinois says:

"This instruction presents the question of extent of care and diligence the law requires of railroad companies, in exercising their franchises, for the safety of the community at large, not under their control as passengers.

"They cannot be held to answer for latent defects in the materials employed in the construction of their machinery which the usual and well recognized tests of science and art afford for the purpose but failed to detect. Nor are they liable for accidents occurring by which injury ensues, when skill and experience are not able to foresee and avoid them; nor for the acts of persons not in their employment, and over whom they have no control, or where they have exercised judgment and skill in selecting the materials, manufacturing their machinery, and in its use upon the roads, or in selecting machinery manufactured by others.

"While, however, this degree of diligence and care is required, these bodies are not, nor does the law require that they should be, responsible for the safety of persons in and about their depots, at all hazards. When they have so far as this employment of reasonable skill and experience enables them, employed experienced, skillful and prudent servants in the use of their machinery; have selected good and safe machinery, so far as known and well recognized tests can determine, constructed of proper material, free from defects, so far as like tests will disclose, neither reason nor justice requires that they should be held liable for injuries that may result from using their franchises."

An instruction to the effect that the mere fact of an explosion was not *prima facie* evidence of negligence was held bad, the court declaring that where the proper tests had been applied by experienced persons with prudence and skill, an explosion was *prima facie* evidence of negligence.

Negligence.—A brick falling from the structure of a bridge.

From the recent English case of *Kearney vs. The London, Brighton & South Coast Railway Company*, we take the following:

The defendants' railway crossed a public highway by means of a bridge, which consisted of iron girders resting on perpendicular piers. As the plaintiff was passing along the highway under the bridge a brick fell out of one of the piers, and did him serious injury. It also appeared that the pier being shortly afterwards examined, there were several other places in it from which bricks appeared to have fallen since the accident. The jury having found for the plaintiff: *Held*, that there was evidence of negligence sufficient to support their finding.

MECHANICS AND ENGINEERING.

Floating the Caisson for the East River Bridge.

The work of floating across from the Atlantic basin the caisson of the East River Bridge destined for the New York side was successfully accomplished yesterday afternoon. About half-past four o'clock, all preparations having been completed, at a given signal the huge mass was taken in tow by seven propellers, whose united force soon drew it into the river. In the mid channel, however, the caisson felt the effects of the full flood tide, and slowly but irresistibly began to drag the propellers up the river. It was a very exciting spectacle. Fears were entertained lest the floating mass should bear down upon and crush any of the numerous passing barges, and some of the Williamsburg ferry boats coming down at the time, though their whistles gave shrill expression to the feeling of alarm excited in the minds of the pilots by the possibility of a collision. The propellers, however, finally, and, no doubt, by putting on extra pressure of steam, succeded in recovering ground and bringing the unwieldy monster under control, and at half-past six o'clock the caisson was securely laid at the final destination, alongside pier 29.—*New York Herald, September* 12.

The Griswold Method of Testing Steel Rails.

The Pittsburgh *Commercial* gives a new method of testing steel, so as to insure uniform and superior quality in steel rails, now coming rapidly into general use on the railroads of the United States. By the Griswold method, a test ingot from each five-ton ladleful of liquid steel is hammered into a bar and tested for malleability and hardness, and especially for toughness, by bending it double when cold. In case the test bar falls below the standard suitable for rails, all the ingots and the rails rolled from them are stamped with the number of the ladleful. To ascertain whether the rails will endure actual service on the track, a piece is cut from one rail in each charge and is tested by placing it on iron supports one foot apart, and then dropping a weight of five tons on the middle of it from a height proportioned to the pattern of the rail. In case the test rail does not stand the blow deemed proper, all the rails made from that ladleful of steel are rejected for use on railroads.

Prices of Rails in August.

Bigelow & Johnston, No. 48 Pine street, New York, report as follows the prices current for rails during the month ending August 31st, 1871.

	Gold.	*Currency.*	*Import, tons.*
New Rails:			
English	$56½ @ 57½		22,329
American		$70 @ 71	
Total import this month			22,329
Import since January 1			115,891
Total to date			138,220
Same time, 1870			103,701
Old Rails:			
Double heads	$39¼ @ 39½		
T or flange	38½ @ 39		7,662
U or bridge	Nominal.		
Total import this month			7,662
Import since January 1			26,550
Total to date			34,212
Same time, 1870			28,274

"The quantity of foreign rails on the spot is very small, yet there have been considerable transactions to arrive within our quotations, and our American mills (especially the Western) are quite well supplied with orders up till November, at prices ruling the last two months.

"Old rails still continue scarce, more especially double heads, and we note large sales ex-ship of mixed lots at prices quoted"

Proposals for the Fairmount Bridge.

The Philadelphia correspondent of the *Iron Age* says:

"Owing to a difficulty in the former letting of the contract for the construction of this bridge, new proposals were advertised for, and lately opened. As a guide for other work of the same character, the tenders are given as follows: Six works competed, among which are included the leading bridge builders of the country, and the prices named bear a fair proportion to what such work can be obtained at: *Kellogg Bridge Company, Buffalo.*—Wrought Iron, 7 cents per pound; cast iron, 5 cents per pound. Superstructure—two or three trusses, $700 per lineal foot; roadway trusses, over a street, including lateral braces, $111 per foot. *Keystone Bridge Company, Philadelphia.*—Wrought iron, 8½ cents per pound; cast iron, 5¾ cents; cast iron balustrade, $9.50 per foot; cast iron railing pedestals, $35 each; do. column pedestals, $65 each; lamps and stands $90 each. Superstructure—two trusses, $824.50 per lineal foot; three trusses, $750; road trusses, $109 per foot. *J. H. Coffrode & Co., Philadelphia.*—Wrought iron, 8¾ cents; cast iron, 5¾ cents; balustrade, $9; wrought-iron railing, $6; pedestals, $35 each; column

do., $85. Superstructure—two trusses, $900 per foot; road trusses, $100 per foot. *John W. Murphy, Philadelphia.*—Wrought iron, 9 cents; cast, 6 cents, per pound; balustrade, $12; wrought iron railing, $9; pedestals, $75 each; column pedestals, $110 each. Superstructure—trusses, $910 per foot; road trusses, $128 per foot. *Phœnix Iron Company, Pa.*—Superstructure—trusses, $792 per foot; road trusses, $112.24 per foot. *Baltimore Bridge Company.*—Trusses, $1,149 per foot; road do., $300 per foot. As will be seen, there is considerable variation in the prices put upon the work. The bridge will be a double-deck bridge, with long approaches and a separate elevated roadway over the track of the Pennsylvania Railroad, at the west end. The streets now crossing this track at grade are to be changed so as to cross 24 feet above the rails. The work is intended to supply the place of the present suspension bridge, now unsafe by age, and will be a large and expensive undertaking."

Overworked Railroad Employes.

The following letter has been addressed by Mr. M. T. Bass, M. P., to the Chairman of the Midland Railway :

LONDON, August 9.

MY DEAR PRICE : I have now the pleasure to lay before you a relation of a number of cases of workmen employed on the Midland Railway, of their hours of labor, and their rates of wages. As I explained to you personally, I thought it better to address you in this form than to raise a discussion at your half-yearly meeting before an audience on whose sympathy, from past experience, I would harly venture to rely.

I begin with the work performed by John Walker, late engine driver in the service of the Midland Railway Company, from December 5, 1870, to March 4, 1871.

He was once on his engine 10 hours and 10 minutes; once 11 hours, once 11 hours and 40 minutes, once 12 hours, five times over 12 hours, nine times 13 hours, three times over 13 hours, three times 14 hours, three times over 14 hours, three times 15 hours, three times over 15 hours, four times 16 hours, eight times over 16 hours, five times 17 hours, four times over 17 hours, once 18 hours, twice over 18 hours, once 19 hours, once 20 hours, once 22 hours, once 23 hours, once 24 hours, once 28 hours.

These particulars, I am assured, give a general view of the work performed by engine drivers during the winter months of 1870–1, for proof of which I refer you to the time books at the engine sheds at St. Pancras, Bedford, Wellingboro', Leicester, Derby, Toton Sidings, Nottingham, Sheffield, Leeds, Bristol, Gloucester, Saltley, etc.

Guards have been worked even longer than drivers. I have had communication with several who have been from 18 to over 40 hours with their trains, and with some who have been with special and other trains for a whole week without having their clothes off; for proof of which see guards' time sheets at Bristol, Gloucester, Derby, Birmingham, etc. And many, while performing this extra work, have had no extra pay.

I have corresponded with many pointsmen, who state that they have to work 12 hours a day, with no time for meals, but are all day long at their points and signals, and when not attending to passenger trains they have the points to reverse and signaling to attend to for goods trains, light engines, shunting, etc. They have been so oppressed with excessive work as to be unable to perform their duties efficiently, with due regard to the safety of the public or the interests of their employers.

I have learnt that at one of the boxes near Leeds from 200 to 220 trains passed during the 24 hours, each train having to be entered in a book nine times. During the 24 hours the beats on the bells "give and take" 6,038 times; beats on the needles "give and take" 6,150; levers to pull over, 464. This is exclusive of shunting and transfer of traffic.

This enormous amount of work and oppressive responsibility is imposed on two men with salaries, I am informed, of 22s. a week each. May I not ask whether the work required is not excessive and the wages totally inadequate to the duties required?

I have a statement from a signalman in the following terms :

"I hold the responsible and dangerous position of a signalman. I have to stand 12 hours a day on duty. I have not time between the passing of trains to get a meal of food; that is out of the question. I have to eat my food with one hand while I attend to my points, signals, and block telegraph with the other hand for seven days a week, while at 'change day,' from night to day service, once a fortnight, I have to stand at work 18 or 19 hours for the sum of 20s. 3d. per week, and some of my comrades, working seven days a week, only get 18s. 3d. The common porters work from 16 to 19 hours per day for 15s. 5d. per week, with some little addition for overtime; but for the least mistake we are then severely fined. How do you suppose a man with a family is to live on 15s. 5d. per week—4s. 6d. or 5s. house rent, etc.?"

Here follow extracts from letters from different servants on the Midland line :

"*July* 21.—I have held the responsible place of signalman or pointsman under the Midland Railway Company, and have been in the service as porter for over five years, and never had a Sunday to myself, only the Sunday I get off for my week's leave of absence, and then I am stopped payment for that time; and now I am holding the responsible place of pointsman, with seven levers to work and the block system, as well as other work, for a wage 18s. per week, and have been making 14, 15, and sometimes 18 hours per day, and nothing extra. I have begun my duty at 7 in the morning until 11 and 12 at night, and no one to come and relieve me; and after I have done signaling, I have to walk half a mile in both directions to put the lights out, and have not even a top coat allowed."

"I have been under the Midland Railway Company nearly 14 years, and during that period have not known what it is to have a Sunday off, unless I have worked on the Saturday and Sunday every other week 18 hours, with the exception of one year, when I was fortunate enough to have no Sunday work, but then I often made eight days a week and got nothing extra for it. My wages are now 21s. per week; I began with 16s. I am allowed £2 10s. per year bonus, if I am fortunate enough to get it; but if I am only fined 1s. I lose the bonus for that year, and I have to struggle on for another. I am allowed one suit of clothes per year, but we pay for them at the rate of 1s. per week, and when we have paid for them they actually order us to bring them in when we are supplied with another suit. Twelve hours are too long for any man to be shut up in a box, where he has to get his meals as best he can."

"We have 12 hours night and 12 hours day duty, and I can say with a clear conscience that I have not time to eat my meals or sit down. We average about 200 trains in 24 hours, besides engine shunting and piloting every minute. We have on our hands all this responsibility for the sum of 18s. per week of six and a half days. I have been running about with my dinner in my hand, putting it down, and taking it up, and biting at it like a dog. I have put it on the shelf over my work frequently, and bite and sup until it is finished."

I have in my possession a great many cases of a similar character, but enough has, I hope, been said to insure your attention to questions of so much gravity.

I will conclude by quoting from the *Times* of Monday, August 7, a part of the cross-examination in the case of Oliver Merrtit, who was charged with the manslaughter of Miss Kirkpatrick, at Unstone, on the Midland line. It was proved that he worked as pointsman 13 hours every day but Saturday, when he worked 15 hours, and every alternate Sunday, for 17s. a week. Let me ask, is it possible for a man to perform properly the responsible and dangerous duties of pointsman for so many hours, and is it reasonable to expect that well qualified men will undertake such duties for 17s. per week? I was not surprised to hear from the Superintendent of Police at Derby that he has recently had twenty applications from pointsmen on the Midland Railway for situations in the police force, because they say their occupation is so dangerous and their wages so inadequate.

I count confidently on your receiving this communication in the same earnest spirit which prompts me to address it to you.

I propose to send this letter to the newspapers, and I request your permission to do the same with any answer you may be so good as to send me.

I am, dear sir, yours very truly,
M. T. BASS.

W. P. Price, Esq. M. P., Chairman of the Midland Railway Company, Derby.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.

Proceedings of the Fourth Annual Convention.

Last week we gave the proceedings of the first day's session of the convention. We give below the proceedings of the second and third days, for which we are indebted chiefly to the reports published in the Louisville *Ledger* and the *Courier-Journal*, which we have corrected for our columns :

SECOND DAY.

REPORT OF THE COMMITTEE ON DEAD WEIGHT OF ROLLING STOCK, BY MESSRS. MEIER, BENTON AND GIBBS.

The experience of the past year affords no reason to change the opinions of last report. The "narrow gauge," many hold, is the remedy for getting rid of useless dead weight, but the committee do not so consider it. Data of several "narrow-gauge" roads show that it is evident if the seating capacity of the wider gauges was made more narrow, or reduced, they would necessitate less weight than the narrow gauge. In the seats and trucks are found material for reduction. It is desirable that changes should be made in harmony with the existing width. Changes should be first thoroughly tested. While track is being torn into ribbons, stockholders, superintendents, and the traveling public are grumbling.

All concur in the value of large boiler space, especially in handling heavy trains. The great difficulty in reducing dead weight seems to be in the large boiler. Light boilers, or lighter pots, are necessary to achieve the end in view. The plan of Mr. Forney seems to secure a greater percentage of adhesion and reduction of dead weight. Should his theory of locomotive construction be well founded, it would seem to meet the requirements of the case.

The convention is requested to investigate this plan.

C. E. BENTON, Chairman.

Moved and carried that the report be received and published with the minutes.

REPORT ON STEEL TIRES, WHEELS AND AXLES (F. A. PERRIN, CHAIRMAN.)

It appears by statements of leading manufacturers (Krupp, 19,000; Cooper, 11,565, etc.) for the year 1871, that the tires sold show an increase over last year, though more steel tires have been sold than were reported. Of the whole number, we find details of the performance of 653 sets.

The report contained voluminous statistics concerning the wear and mileage of steel tires for locomotives, showing the relative durability of those made by different manufacturers; also a record of the breaking of steel tires, of steel wheels and axles, and was rather unfavorable to the use of steel axles for cars, tenders and trucks, but favored their use for locomotive driving-wheels. Report filed.

Mr. Glass presented the following in this connection : Engine 26 was put on his track December, 1867, and run until March 1, 1871, a distance of 130,094 miles, before tires were turned off. They were then in a much better condition than many running only six months. The tires were then turned off, or it could have run a year longer. Made by Firth.

Mr. Towne thought more steel tires were broken from shrinkage than otherwise. On his road none of Krupp's, Vicker's and some others' tires had never broken. We allow a five-foot wheel about the twenty-fourth of an inch shrinkage.

Mr. Hayes allowed his tires the same shrinkage. Two of his cracked longitudinally fifteen inches, and are straight across; but it showed the tire was imperfect before being put on, and shrinkage had nothing to do with it.

Mr. Lander, of the Northern Railroad of New Hampshire, had made his report as perfect as possible, but he had sent questions to master mechanics, with request to answer by the first of August, and the time was too limited for full replies.

Mr. Glass said his engine, No. 26, run twenty-two miles per hour—the track was fish-plated.

Mr. Hain, of the New York Central, was called on to give a statement of the French tire used on his road. This was a good tire, running, often, 60,000 miles before turning. They were allowed a shrinkage of one-hundredth part of an inch to the foot, invariably.

Mr. Sellers, of the Memphis & Charleston, had a statement of an engine on the Pennsylvania Central that run 153,000 miles without turning off. In the report the greatest run was 123,000 miles. It did not state whose tire it was.

Mr. Lander did not think the report had anything to do with the presentation of extraordinary tires. The basis of the report was a given number of miles run to an average wear.

Mr. Sellers thought more depended on the character of the road. In the South, where there were roads, if they get 50,000 miles they were doing well.

Mr. Setchell thought much, of course, depended on the circumstances of each case. He did not want the Association to become an advertising medium for any particular tire.

Mr. Glass' object in making the statement was because he thought it an extraordinary run.

Mr. Skidmore, of the Louisville, Cincinnati & Lexington road, wanted to know of Mr. Glass if his tire was worn uniformly.

Mr. Hayes had some engines on this road that run over 130,000 miles; but when he come to turning, he found they did not run to 1-16 of an inch in 50,000 miles.

COMMITTEE ON CORRESPONDENCE.

Mr. Dodge read a communication from Samuel Gill, Superintendent Louisville, Cincinnati & Lexington road, offering the use of his road to the Jefferson Fair Grounds. Received.

The committee were instructed to make arrangements for accepting the invitation, and set a day for the visit.

A dispatch to the President, for the Association, from Mr. Goshorn, of Cincinnati, tendering an invitation to visit the Industrial Exposition.

A letter from J. P. Pendleton, master mechanic, of Portsmouth, Va., expressing his regret at his necessary absence from the meeting.

Copies of the *Railway Manual* tendered for the acceptance of the members by Mr. Cohen.

D. W. C. Rowland and Fletcher Perkins, of the Louisville & Nashville Railroad tendering passage over their road to any point thereon the association may wish to visit, and suggested the Mammoth Cave. Provisions will be made for lunchon the dining cars during the visit. Received and referred to the Committee on Invitations.

Mr. Lander, of the committee, thought the members should decide the question of going for themselves at once.

On motion, the invitation was unanimously accepted.

REPORT ON CONSTRUCTION OF FURNACES.

Forty miles to the ton of coal on freight, for some roads, reported used, other roads varying but little from this. On the Pennsylvania road, bituminous coal preferred.

New York Central Railroad, on construction of furnaces, use Jauriet patent fire-boxes. Two tons of coal to 100 miles, and 4,500 gallons of water.

Missouri Pacific Railroad, plain fire-box best furnace for bituminous coal. Report 65 miles to ton of coal; 20 square feet of grate surface.

Mr. Town, Hannibal & St. Joseph—See no furnace equal to Jauriet's patent. For six months passenger average 53 miles to ton of coal; freight, 43 miles. Coal used is of a poor quality.

Report received and placed on file.

The Secretary called the roll of members, and an opportunity was offered those who had not signed the constitution to do so.

The following gentlemen then came forward and signed the constitution :

W. H. Bryant, Pittsburgh, Fort Wayne & Chicago Railway, Chicago, Ill.

G. F. Morse, Portland Locomotive Works.

John McVey, Western Railroad, of Alabama.

W. H. Griggs, New York & Oswego Midland.

O. A. Haynes, St. L uis & Iron Mountain.

Josiah Bettis, New Orleans, Mobile & Texas Railroad, Mobile, Ala.

STYLE OF ENGINE FOR FREIGHT SERVICE.

Report on style of engine for freight service received and placed on file.

REMARKS.

Mr. Jordan, of Cumberland & Pennsylvania road, had two of the consolidation patent engines on his road, which were easier on the track than the Campbell engine, and the best freight engine running.

Mr. Maggin wished to know the size of the cylinder, and amount of steam carried.

He was answered by Mr. Jordan that it was a 20-inch cylinder with a 22-inch stroke, and 110 pounds of steam carried, and 48-inch diameter of wheel. Rate of speed, 10 miles per hour.

Mr. Setchell wanted to know how many loaded cars this engine would pull up a 170-foot grade.

Mr. Jordan had not tested its capacity in this respect.

Mr. Willis, of the Jeffersonville, Madison & Indianapolis road, said that on a grade of 320 feet to the mile, using the simple weight of the engine as adhesive, with same cylinder named by Mr. Jordan, he found no difficulty by using side cylinder, and could draw up this grade sixteen empty cars, and six cars of ten tons each, carrying 120 pounds of steam, ten miles per hour, and run with less expense than usual. Save the wear and tear, it is nothing. The length of that grade was one mile and a third. He thought it the best engine for this kind of work. The total outside lap is five-eighths of an inch on a side; no inside lap.

COMMITTEE ON PRACTICABILITY OF PLACING INDICATORS UPON ENGINES.

Committee—Hudson, Williams and Leech. Had received answers from twenty-six master mechanics.

Mr. Boon thinks it advisable to place indicators on engines; thinks accidents caused, for most part, by excessive steam. In spite of men being discharged for violation of rules, they continue to do so. Indicators without a registering arrangement and correct time-card are useless. Temptation to make excessive speed would be removed, with an indicator to tell, as soon as a wreck occurs, the amount of steam. An apparatus of this kind was in existence, as shown by an article in *Harper's Weekly*. The degree of velocity is easily indicated by this apparatus, and is independent of the control of the engineer, and could be easily indicated to any one.

Mr. Pendleton, in answer to a communication from the committee, replied that he had no indicator of the kind mentioned.

Mr. Setchell approved of this new indicator. It was useful, also, in declaring the rate and speed of train, useful in case of accidents in showing speed of train; as men are always ready to swear in such cases that the train was going sixty miles per hour.

Mr. Gibbs also commended the consolidation engine, though he had no such instrument. It made one "pick" on the paper, on its surface, to every nine revolutions.

Mr. S. J. Hayes thought it not desirable to place speed indicators on all engines, though one for every two or three would be useful.

Mr. Towne thought if an instrument could be constructed to indicate time, rate of speed, etc., and out of reach of the engineer, it would be valuable.

The committee call attention to an indicator patented by C. A. Linear, and commend it.

Report received and filed. A pamphlet on the subject, by C. A. Linear, accompanied the report.

The Committee on Invitations report that those who wish to avail themselves of a visit over the bridge, should be at the Fourteenth Street Depot by 3:40 p. m.

Mr. Lander reported that the train for Mammoth Cave would leave at 12:15 p. m. each day. The association was requested to notify Mr. Perkins what day they would go; but as it would take two days to make the trip, he would recommend a reconsideration of the vote passed to make this trip. The motion prevailed.

Mr. Setchell moved that Mr. Perkins be informed of the Convention's inability to make the visit, and respectfully decline the invitation, while thanking Mr. Perkins for the invition. Carried.

Mr. Wells remarked that a number wished to go, and that those who would might go as individuals, though the Association could not go as a body.

Mr. Burke suggested a special committee to get the names of those who wished to go.

THE REPORT OF COMMITTEE ON APPLICATION OF COMPRESSION BRAKES.

It is practical to put the compression brake in the control of engineers, though they had no model for the same. Mitchell, Shaver and Ham, committee.

Mr. Wells, of the Jeffersonville, Madison & Indianapolis road, remarked that those going to New Albany this evening could see this brake on the road, as one was in use on that road.

COMMITTEE FOR CHANGING TIME OF HOLDING NEXT MEETING.

Mr. Johann, of St. Louis, made a verbal report, announcing that the committee had considered the question, and recommend the month of May as the proper time for meeting. Report received.

FIRST AMENDMENT OF THE CONSTITUTION.

Mr. Wells moved that the Constitution of the Association be so changed as to read "the second Tuesday in May," as the day of meeting, instead of "the second Tuesday in September," it requiring a two-thirds vote to make the change. Carried unanimously.

Mr. Devine moved that the election of officers be postponed until the next annual (May) meeting. Carried.

It was moved that those members of the Association in good standing be known and recognized as honorary members thereof.

Mr. E. D. Palmer sent a resolution naming certain gentlemen for honorary membership. Carried.

[The names of those mentioned are: H. M. Britton, W. F. Smith, O. H. P. Little, Thomas Grinnell, Wm. Swanson and Reuben Wells.]

A communication on the subject of boilers, from Mr. Piersall, foreman of the Memphis & Charleston road, was received and ordered to file.

Mr. Shaver moved that the Secretary notify, by letter, those who have been elected honorary members.

A motion by Mr. Setchell to reconsider the resolution making certain gentlemen "honorary members" was carried. And also that they be made "active life members," and entitled to all the privileges and franchises, without paying dues. Laid on the table.

Report of committee on the merits of steel for links, guides and crank-pins, as compared with the best quality of iron, case-hardened. Had communications from thirty-two master mechanics. They think case hardened iron better than steel for the purpose. The New York Central has engines that have entire crank-motion made of case-hardened iron, which have run over five years without being taken up. Received and filed.

Report of committee on "what proportion should the surface of the water in the boiler bear to that of heating surface, and what amount of steam-space for a given heating surface to insure the best results."

The importance of extent consists in the facility for escaping steam. In case of locomotive boiler, it is useless to inquire what ratio, as the area can be no larger than a certain proportion, as the area of surface heating is fixed. It is only determinable by experience. A large space for steam is desirable. Some of the disadvantages arising from small steam space may be remedied. The larger the better. Excellent performance has been obtained from boilers when the area of the water surface is from 1-15 to 1-16 of heating surface.

On motion of Mr. Burke a committee of five were appointed to draft subjects for discussion at next meeting. The following gentlemen were appointed: Messrs. Burke, Memphis & Charleston; Wells, of the Jeffersonville, Madison & Indianapolis; Boon, of the Pittsburgh, Fort Wayne & Chicago; Grant, of the Rockford, Rock Island & St. Louis, and Williams, of the Baldwin Locomotive Works. Mr. Sellers was appointed in place of Mr. Burke.

STEAM-MACHINE RIVETING.

Report read and ordered to file. Work by machinery was long distrusted, but now it can be done better than by hand. They find hand-riveting not without objection; the violent hammering is injurious. Again, so much depends on the skill of the workmen that the results vary. The piston machine was commended; as it was restricted in its movements a uniformity was attained. The heading is done on the cupping system, and could not spread or scatter. Rivets driven by the piston-machine show the hole well filled, and steam-machine riveting is superior to that done by hand.

Received and filed with the minutes.

The ladies of attending members were invited to visit New Albany with their escort.

Meeting then adjourned until nine o'clock the next morning.

THIRD DAY.

On this day (Thursday) a large number of members left the city for their homes. Quite a delegation, including many ladies, left for Mammoth Cave that day, the Louisville & Nashville Railroad Company having extended the courtesies of its road to the Association. In the course of the proceedings, votes of thanks were tendered to the citizens of Louisville, the various railroad and other companies that have shown politeness to the Association, to Colonel Jilson P. Johnson, of the Galt House, and to the Louisville press.

Before the meeting was called to order the following gentlemen registered their names as members of the Association, having signed the constitution and by-laws:

John C. Calhoun, North Missouri Railroad, St, Louis.

James Cooke, Danforth Locomotive and Manufacturing Company.

A. J. Maynes, Selma, Rome & Dalton Railroad, Selma, Ala.

John C. Ellis, President Schenectady Locomotive Works.

B. H. Kidder, Buffalo Division Lake Shore & Michigan Southern Railway.

G. H. Tier, Toledo Division Lake Shore & Michigan Southern Railway.

The meeting having been called to order, President Britton in the chair and a large attendance present, the first report upon

LUBRICATING OILS,

Mr. Burke, Memphis & Charleston Railroad, Chairman of the committee, was read and adopted. The report stated that letters had been received from master mechanics representing twenty-seven different roads, but that the information derived from these was not sufficiently general to lead to a satisfactory conclusion. For a fast passenger train, lard oil seems to be the most satisfactory in its results, while for a slow freight earth oil seems to be the best, which should be heated to 28 or 29 degrees in winter. For lubricating cylinders, tallow was the best adapted, although lard oil was also used. The system of steam lubrication had also been used with success. The use of plumbago was not sufficiently extensive to warrant its adoption, but it had been successful when employed. The members of the Association were called upon to contribute their experience. The report of the Committee on

SAFETY VALVES,

Wells, Jeffersonville, Madison & Indianapolis Railroad, Chairman, was next in order, but, from reasons satisfactorily explained, the committee has not been able to collect sufficient data to make a report. The report on

CYLINDER AND STUFFING-BOX PACKING,

D. W. Haynes, Northeastern Railroad, of South Carolina, Chairman of the committee, was next read and adopted. Reports had been received from thirty-six different master mechanics, of whom fifteen were in favor of steam and the remainder of spring packing. The highest mileage obtained in the former had been 200,000 miles, and the lowest 18,000; the highest in the latter had been 150,000 miles, and the lowest 15,000. The former possessed the advantage of greater economy of construction, but the latter, although more costly, was so successfully used as to offset this for reasons detailed in the report. Twelve of those reporting were in favor of hemp for stuffing boxes, twelve for soapstone, and eight for a combination of both. There had been no information obtained as to cylinder packing.

Mr. Burke, of the Memphis & Charleston Railroad, stated that Mr. Dunbar had requested that his steam-packing process should be tried upon the Memphis & Charleston road. This had been done for one year, and the results were satisfactory. While not wedded to this process, he made the statement in justice to Mr. Dunbar.

The committee on uniform thickness of wheels and cylinders, Mr. Pendleton, of the Seaboard & Roanoke Railroad, Chairman, presented no report.

REPORTS FOR THE NEXT ANNUAL MEETING.

The President here stated that all the reports to be brought before the attention of the Convention at this meeting had been read, and that the topics for discussion at the next annual meeting in May, with the committee to whom reports would now be confided, would now be given, which are as follows:

Boiler and Boiler Materials—Hayes, Illinois Central; Jauriet, Chicago, Burlington & Quincy; Lamb, Des Moines Valley.

Steel Tires—Perry, Cheshire & Ashuelot; Lander, Northern New Hampshire; Studley, Concord Railroad.

Boiler Incrustations—Towne, Hannibal & St. Joseph; Boon, Pittsburgh, Fort Wayne & Chicago; Johann, Missouri Pacific.

Boiler Explosions—Grant, Rockford, Rock Island & St. Louis; Gorman, Toledo, Wabash & Western; Calhoun, North Missouri.

Construction of Valves and Valve Gear—Clark; Garrett, Pennsylvania Railroad; Cook, Danforth Locomotive Works.

Finance—Britton, W. W. V. R. R.; Sedgley, Lake Shore & Michigan Southern; L. H. Sellers, Memphis & Charleston; Boon, Pittsburgh, Fort Wayne & Chicago.

Best Method of Securing Driving and Truck Brasses—Boon, Pittsburgh, Fort Wayne & Chicago; Young, Cleveland, Columbus, Cincinnati & Indianapolis; Tier, Lake Shore & Michigan Southern.

Application of Compression Brakes—Mitchell, Lehigh Valley; Graham, Lackawanna & Bloomsburg; Street.

Best Method of Constructing Tender Trucks—Rennie, Pittsburgh & Connelleville; Cummings, Pittsburgh, Fort Wayne & Chicago; Shaver, Pennsylvania Railroad.

Safety Valves—Robinett; McFarland, Richmond, Danville & Piedmont; John Haines.

Is there any Material or Device for Packing Stuffing Boxes More Economical than Hemp?—L. H. Sellers, Memphis & Charleston; Bassett, Lake Shore & Michigan Southern; Eastman, Nashville & Chattanooga.

Printing—Britton, Chapman, Setchell.

General Supervisory Committee—Committee of last year continued, consisting of the officers of the Association.

Relative Merits of the Narrow and Broad-Gauge Railroads—Burke, Memphis & Charleston; Waugh, Kansas Pacific; S. M. Philbrick, Leavenworth, Lawrence & Galveston.

The Relative Advantages of the Straight and "Wagon-top" Locomotive Boiler and the Proper Location of the Throttle Valve; to Reconsider and Discuss Fully the Throw of Eccentrics, the Lap and Lead of Slide Valves, and Discussion of Parts for Various Classes of Engines—Philbrick, Maine Central; Griggs, New York & Oswego Midland; Kinsey, Lehigh Valley.

Comparative Performance and Cost of Operation of 8 and 10-wheel Engines for Freight Service—Jordan, Cumberland & Pennsylvania; Hoficker, Lehigh Valley; Graham, Lackawanna & Bloomsburg.

Comparative Performance and Cost of Operation of 10-wheel Engines with Six Drivers Coupled, and 8-wheel Engines with Six Drivers Coupled—Ham, New York Central; Hill, Erie; Sedgley, Lake Shore & Michigan Southern.

Uniform System of Computing Mileage by Engines doing Switching Service—Chapman, Cleveland & Pittsburgh; Smith, Cleveland, Columbus, Cincinnati & Indianapolis; Sedgley, Lake Shore & Michigan Southern.

Uniform System of Examination for Promotion of Locomotive Firemen—Chapman, Cleveland & Pittsburgh; Smith, Cleveland, Columbus, Cincinnati & Indianapolis; Sedgley, Lake Shore & Michigan Southern.

Advisability of establishing different grades of locomotive engineers, according to length of service, character, etc. Referred to Committee on Promotion of Firemen.

ASSESSMENTS.

A committee, consisting of Messrs. Philbrick, Towne and McAllister, was appointed to fix an assessment upon members to defray expenses of the ensuing year. The committee afterward reported upon an assessment of $10 per member, which was accordingly collected from the members present, resulting in $782 collected, with $1,007 still due. On motion, a resolution was passed that at the next annual meeting the names of all delinquent members should be reported.

RESIGNATION OF MR. L. P. DODGE.

Mr. L. P. Dodge, who has acted as Secretary of the Association for three years past, tendered his resignation, which, on motion of Mr. Sellers, was accepted, and a vote of thanks tendered him by the Association for the faithful and efficient manner in which he had conducted the duties of his office. A subsequent resolution, introduced by Mr. Hayes, to pay Mr. Dodge the sum of $500 for his services last year, was unanimously adopted.

ELECTION OF A SUCCESSOR.

On motion, a committee of three, consisting of Messrs. Burke, DeClerg and Garfield, was appointed to nominate a successor to Mr. Dodge as Secretary of the Association. The committee, after retiring, reported the name of Mr. J. H. Setchell, of the Little Miami Railroad, as a candidate. A ballot being held, Mr. Setchell received 46 votes, Mr. Dodge 2, Mr. Sellers 1, and Mr. Towne 1, which, on motion, was made unanimous. Mr. Setchell, in accepting the office, tendered his thanks to the Association for the honor it had done him, promised a faithful performance of the duties entailed, and earnestly requested the co-operation of the members of the Association, without which those duties could not be satisfactorily attended to.

BOSTON THE NEXT PLACE OF MEETING.

On motion of Mr. Skidmore, a committee of three, consisting of Messrs. Kerr, Johann and Waite, was appointed to select the names of cities to be voted on as the next place for the annual meeting of the Association. The committee reported the names of Boston, Washington City, Paterson, N. J., and Chicago. The matter being put to a ballot, Boston received 51 votes, Paterson 2 and Chicago 3, which vote was made unanimous, and Boston selected as the next place of annual meeting.

COMPLIMENTARY.

The President suggested the propriety of appointing a committee to draft resolutions expressing the thanks of the Association to the citizens of Louisville; Col Jilson P. Johnson, of the Galt House; Horace Scott, of the Jeffersonville, Madison & Indianapolis; Col. Samuel Gill, of the Louisville, Cincinnati & Lexington; Thatcher Perkins, Louisville & Nashville; proprietors of the Gas Works, and the Ohio Falls Car Company, of New Albany: A. N. Kellogg, of the RAILROAD GAZETTE; J. H. Coyne, of the *Railway Officials' Manual*, Chicago, for courtesies extended the Association during its stay in the city, with also a complimentary notice of Mr. Dodge. A resolution was accordingly passed to that effect, added to which the thanks of the Association were tendered the newspaper press of Louisville for able and correct reports prepared of the proceedings and other favors shown during the session of the Convention. On motion, the names of Mr. Goshorn, President of the Cincinnati Industrial Exposition, and Mr. Lemuel Hyatt, President of the Jefferson County Agricultural Association, were included in the resolution, and the Secretary requested to send copies of the resolution to each of the gentlemen mentioned.

DEBARRED MEMBERS REINSTATED.

The following resolutions were also moved and adopted:

WHEREAS, The experience of the Association shows that it is only by continued and united effort that the objects of the organization may be obtained; and, whereas, by the constitution and by-laws as at present existing we are deprived of the aid and co-operation of members who may be transferred to other spheres of action than those immediately connected with railway management, be it

Resolved, That any person who has been or may be duly qualified, and signs or causes to be signed the constitution as a member of this Association, remains as such until his resignation may be voluntarily tendered. And be it further

Resolved, That the Association fully appreciates the value and importance to the railway interests of America of the plan of this Association, as originated at Dayton, Ohio, June 10th, 1868, by H. M. Britton, W. T. Smith, O. H. P. Little, Frederick Grinnell, Wm. Swanston and Reuben Wells, and that the Secretary be instructed to cause these resolutions to be handsomely engrossed and a copy sent each gentleman named in the above resolution. And be it further

Resolved, That the Secretary be instructed to notify all former members who may be debarred by the by-laws as hitherto existing from participating in our meeting of this change, and request their further attendance.

ADMISSION OF SCIENTISTS.

Mr. Grant suggested as to the propriety of admitting a certain number of scientific men, whose attainments might be of great advantage to the Association, into associate membership, far the purpose of preparing papers to be read at annual meetings of the Association, to have all the privileges of members except the franchise.

On motion of Mr. Burke, a committee of three, consisting of Messrs. Grant, Burke and Towne, were appointed to revise the by-laws to cover this case. A resolution, in accordance with the above suggestion, was, after some discussion, introduced and passed, as follows:

Resolved, That applicants of the above character shall be admitted to this Association on the suggestion of three members (five dissenting voices being sufficient to debar admission), and not over twenty associate members shall be admitted to membership.

The following gentlemen were then balloted for and elected members of the Association: M. N. Forney, RAILROAD GAZETTE; Alex. L. Holley, of Troy, N. Y.; W. W. Evans, New York; Gordon H. Nott, Boston; Prof. J. Lawrence Smith, Louisville; William B. Bement, Philadelphia; Coleman Sellers, Philadelphia.

Mr. Philbrick proposed requesting these gentlemen to read papers on subjects appointed for their consideration.

Mr. Burke moved that the officers of the Association should prepare, or cause to be prepared, with reference to these gentlemen, essays, to be read by them or other parties at the next meeting of the Association, which was carried.

MISCELLANEOUS.

A committee was appointed to draft an obituary report relative to the death of Mr. Otis Freeman, of the Toledo, Wabash & Western Railway, which was accordingly so reported.

Mr. Setchell stated that all members of the Association intending to pass over the Little Miami road would be provided with passes upon application to him, as did Mr. Wells, of the Jeffersonville, Madison & Indianapolis, and Mr. Thompson, of the Eastern Division of the Pittsburgh, Fort Wayne & Chicago, as to their respective roads.

COMMITTEE OF ARRANGEMENTS.

The following gentlemen, connected with roads terminating in Boston, were appointed a committee to make arrangements for the meeting of the Association in that city, the second Tuesday in May next: John Thompson, Eastern Railroad; F. A. Waite, Boston & Maine, and George A. Coolidge, of the Fitchburg road.

The Secretary was then requested to notify each committee of the subjects assigned for report, after which, the Convention adjourned to meet in Boston, Mass., on the second Tuesday in May, 1872.

The Louisville *Courier-Journal*, in closing its report says:

"In closing these reports of this Convention, it might be well to refer to the morale of its membership. The gentlemen composing this Association present an appearance remarkable in a collection of so large a number of men—dignified in all their discussions, temperate in their debates, exhibiting marked and varied cultivation outside of the topics upon which they are supposed to be peculiarly familiar, the American Railway Master Mechanics' Association is a body that is a pride to any profession. It is only to be hoped that they are satisfied with their reception here, and may carry away with them actually the impression expressed in their complimentary resolutions."